AVIATION WEEK

AUG. 30, 1954

50 CENTS

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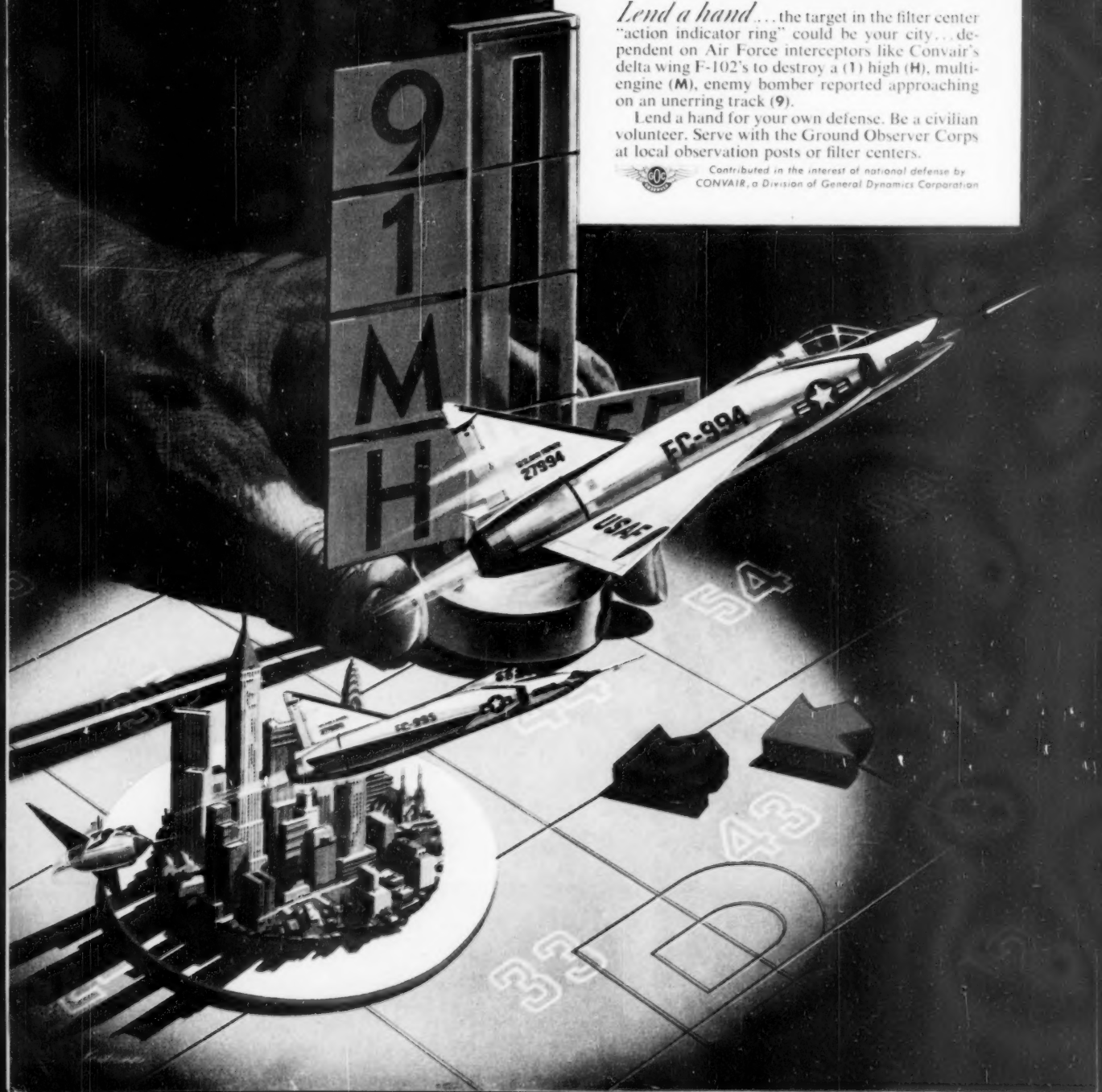

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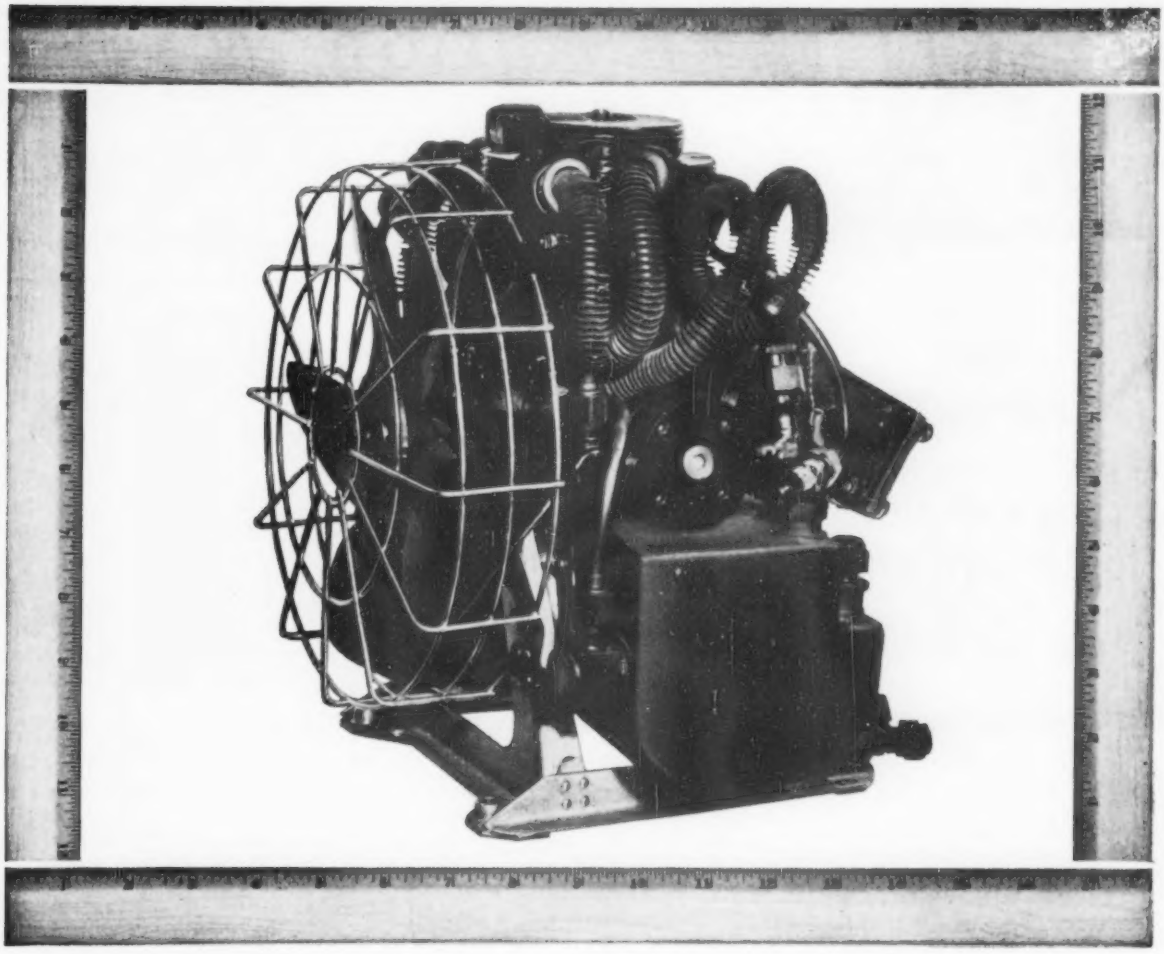

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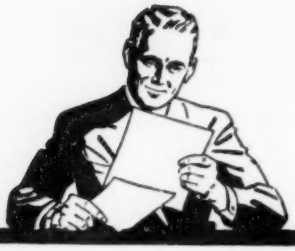

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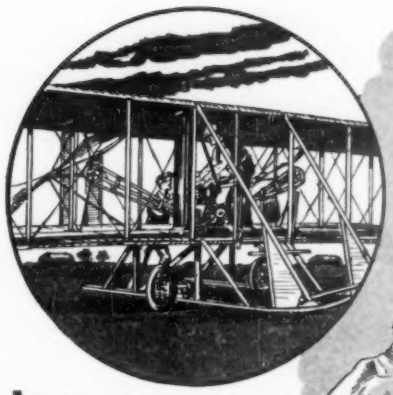
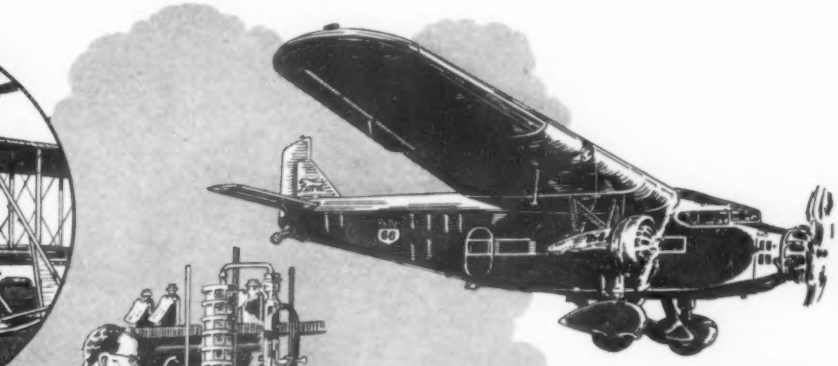
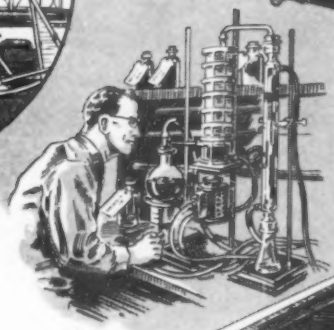
MILESTONES IN AVIATION

How Phillips 66 Pioneered in High Test Aviation Fuel

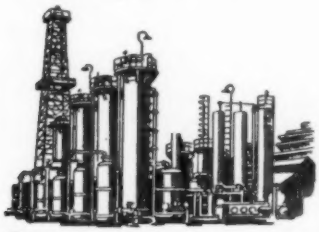


1 Until the early Twenties, airplane engines were often started in cold weather by using ether in a priming cup built into the intake manifold. Engines sputtered until they became hot enough to vaporize regular gasoline.

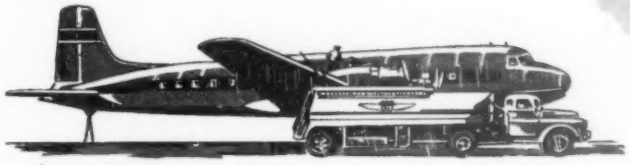




2 Then Phillips Petroleum Company scientists blended liquids from natural gas into aviation fuel—a process which resulted in faster engine warm-up, easier, quicker starts, smoother operation. The powerful, highly volatile elements of natural gasoline improved the performance of aviation engines.



3 In 1942, Phillips put in operation the very first HF alkylation plant—for the production of HF Alkylate, a high-power, high-performance aviation fuel component.



4 Today, Phillips produces tremendous quantities of 115/145 grade aviation gasoline for commercial and military use.

Phillips Petroleum Company has always taken a special interest in aviation. Phillips research programs have always laid special emphasis on aviation needs, and Phillips took an active part in the early, crucial setting up of standards for aviation fuels and lubricants. Phillips research and manufacturing have led the way in the production of many of the major ingredients of aviation gasolines.

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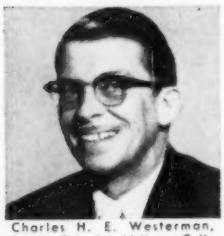

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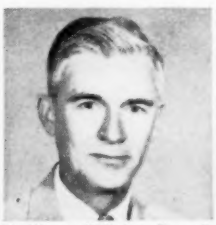

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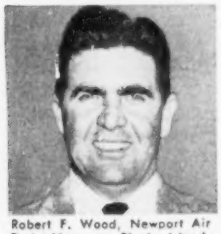

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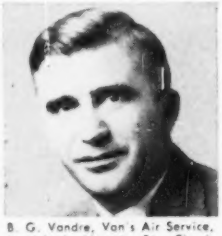

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NEWS DIGEST

Domestic

Third A4D Skyhawk, Douglas Aircraft Co.'s lightweight Navy bomber soon will be rolling off the production line at El Segundo, Calif.—two weeks ahead of schedule. It will be assigned to an aircraft carrier for tests. Both the first and second A4D now are undergoing tests at Edwards AFB. A company spokesman says Douglas has several sizable contracts, expects A4D production to be stepped up considerably throughout the balance of 1954 and the beginning of 1955.

First production GRB-36, Convair's RB-36 modified to launch and retrieve a Republic RF-84 for long-range delivery of atomic bombs at sonic speeds (AVIATION WEEK Aug. 31, 1953, p. 13), has started flight tests at the company's Ft. Worth plant.

Boeing B-47E medium jet bombers and RB-47E photo-reconnaissance planes are being equipped with 6,000-lb.-thrust General Electric J47-25 engines, giving the six-turbojet aircraft 50% more power than the XB-47 when it made its first flight seven years ago.

First production A3D flew nonstop from Muroc, Calif., to Norfolk, Va., in 4 hr. 40 min. on a routine delivery flight of the twin-jet Douglas bomber. Average speed for the 2,385-mi. flight: 500 mph. It will be assigned to the Navy at Norfolk for special configuration modifications.

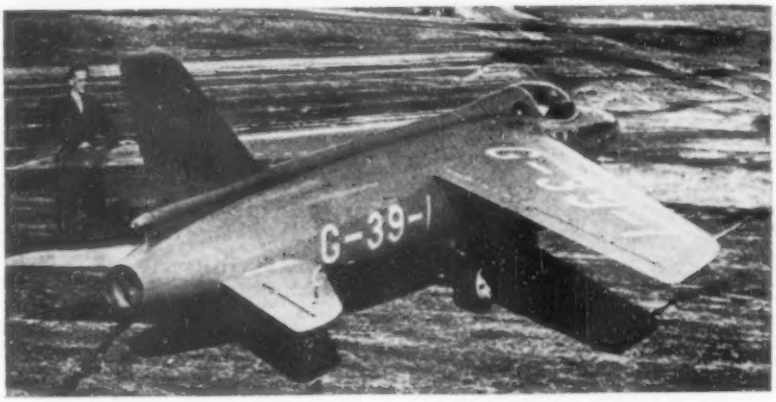
Republic Aviation Corp. has laid off approximately 3,000 production workers in a slowdown of F-84F and RF-84F output to permit the company to clear its accumulation of stored Thunderstreaks and Thunderflashes at Farmingdale, N. Y.

First Piasecki H-21C Work Horse copter has been delivered to U. S. Army. Capable of carrying 20 troops or 16 litters, it is powered by a 1,425-hp. Wright R1820.

First Bell HSL-1 copter was turned over formally to the Navy Aug. 18, then left the Ft. Worth, Tex., plant for a flight to Naval Air Test Center, Patuxent, Md.

National Airlines has purchased two Convair 340s from Pan American World Airways, increasing NAL's fleet of the twin-engine transports to 10.

Atomic aircraft propulsion engineering tests are being conducted at Convair's Ft. Worth plant with a small, lower-power research reactor loaned by the Air Force.



British Test New Lightweight Jet Fighter

Folland Aircraft's prototype Gnat, named the Midge, is expected to attain supersonic speeds when powered by designed-for Bristol Orpheus turbojet, more powerful than its present 1,640-lb.-thrust Armstrong Siddeley Viper. The 20-ft.-span private venture fighter has been flying since Aug. 11. This photo of the Midge, reproduced by courtesy of the British publication, The Aeroplane, shows the craft's shoulder-sweptwing layout. Gross weight is about 4,500 lb. Wing sweep is 40 deg.

Braniff Airways DC-3 struck a power line and crashed last week while approaching Mason City, Iowa, during a blinding thunderstorm. Eleven of the 19 persons aboard were killed, Braniff's first fatalities since 1939.

Twin-engine business amphibian will be manufactured under license by newly formed Royal Aircraft Corp., a wholly-owned subsidiary of Kearney & Trecker Corp., Milwaukee. Called the Royal Gull, the five-place craft will sell for $65,000-$70,000 and has been certificated by CAA. Airframe and wings will be made by the craft's designer, Piaggio & Co., Italy, and shipped to U. S. All other components will be made in this country.

Pacific Airmotive Corp. will inspect and repair USAF C-47s and C-117s, not C-119s as reported by AVIATION WEEK (Aug. 23, p. 7).

Air Force Assn. elected John R. Alison, former Assistant Secretary of Commerce for Aeronautics, president at its Omaha convention. New AFA directors: Charles W. Purcell, Baltimore; George D. Hardy, Hyattsville, Md., and Walter T. Bonney, Washington, D. C.

Variable density tunnel at Cornell Aeronautical Laboratory, Buffalo, N. Y., will be doubled in power to 30,000 hp. under a $1.6-million program sponsored by USAF and administered by Army Corps of Engineers. Laboratory will spend an additional $200,000 of its own funds on transonic throat modification. When complete, the facility will handle plane and missile model test at speeds to Mach 1.25.

Mrs. Tom Braniff, 67, widow of the founder of Braniff Airways and a vice president of the airline, died Aug. 14 at Dallas.

Financial

Curtiss-Wright Corp., Wood-Ridge, N. J., has declared a dividend of 25 cents a common share, payable Sept. 23 to holders of record Sept. 7, and a third quarter dividend of 50 cents a share on Class A that previously was declared will be payable the same day to holders of record Sept. 3. Several earlier common dividends had been 15 cents a share.

International

KLM Royal Dutch Airlines DC-6B crashed in the North Sea 10 mi. off Holland's coast last week on a New York-Amsterdam flight, killing all 21 persons aboard.

English Electric P.1 twin-jet interceptor (AVIATION WEEK Aug. 16, p. 383) has exceeded Mach 1 in level flight several times, becoming first British supersonic aircraft.

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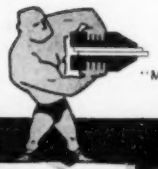

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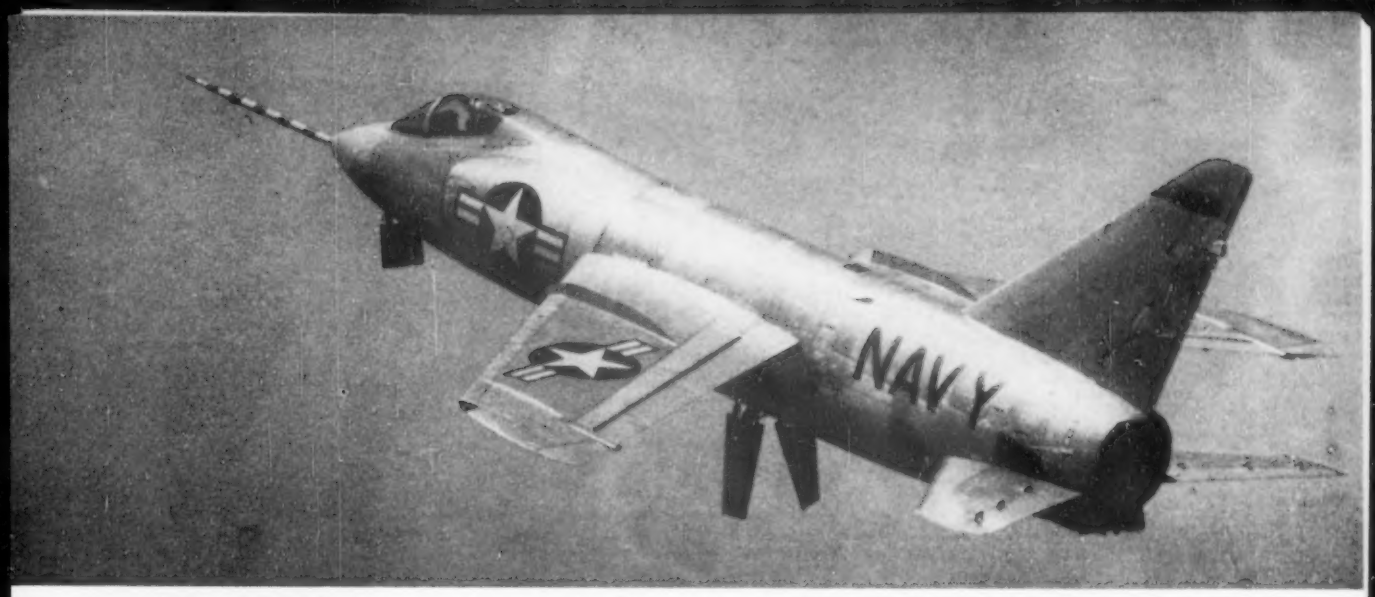
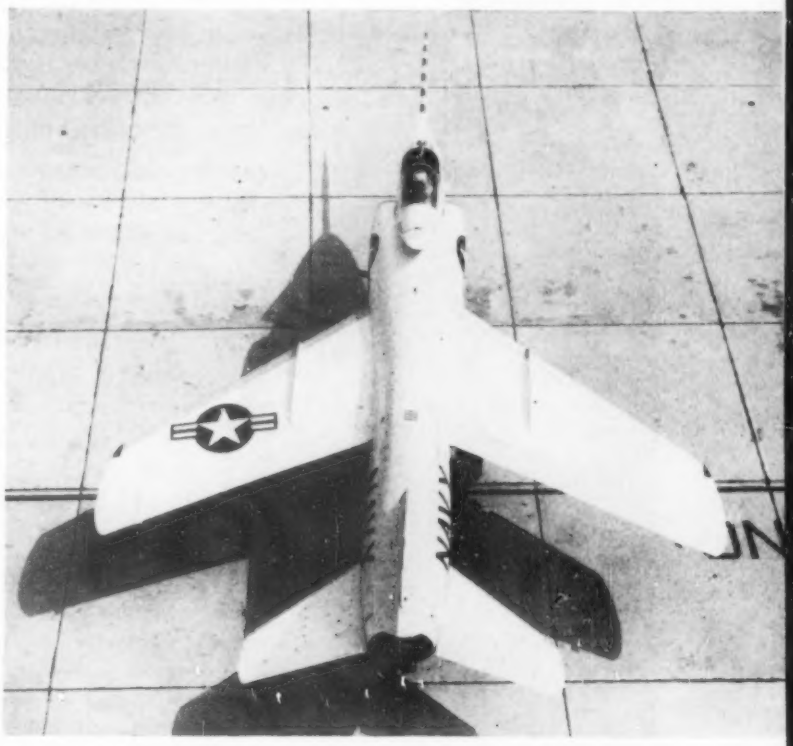


DIVE BRAKES EXTENDED under nose and beneath fuselage rear, new Grumman F9F-9 Tiger prototype slows down to have its picture taken aloft—prior to being painted white (photos below). Supersonic in level flight, the Tiger has a 7,200-lb.-thrust-plus Wright J65-W-7.

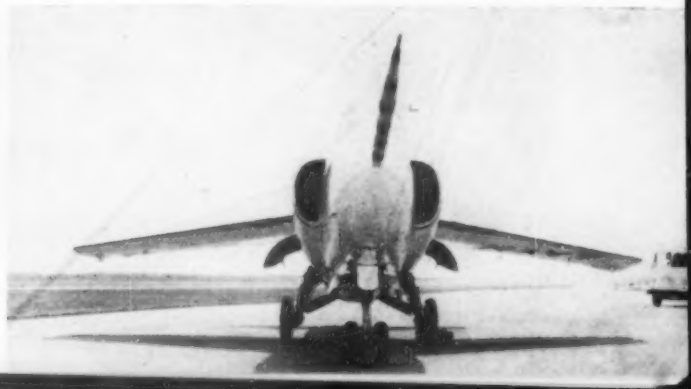
Design Highlights Of New Navy Grumman Tiger



"COKE BOTTLE" FUSELAGE nips in at the wing roots to provide optimum drag characteristics at high speeds. Low-set horizontal tail is operated as a one-piece, all-movable surface at normal speeds; the elevators become operable when the landing flaps are lowered. Although bearing an F9F-series designation, the supersonic Tiger is a completely new design. Production planes will be fitted with an afterburner. Grumman has a $40-million development and production contract for the F9F-9, to be built at Bethpage, N. Y., and assembled at the company's new facility at Peconic River, N. Y. (Also see Aviation Week Aug. 23, p. 26 for engineering story).

MAIN WHEELS retract forward into belly, dual nosewheels fold back. Extremely thin wing and tail sections mark latest Grumman.

LARGE INTAKES for Wright J65-W-7 are on sides of fuselage, a departure from previous F9Fs, which have intakes in wing roots.



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WHO'S WHERE

In the Front Office

William M. Robertson will retire as administrator of Civil Aeronautics Administration's Second Region Sept. 1 to become executive vice president and administrator of Embry-Riddle International School of Aviation, Miami.

Samuel B. Williams, onetime editor of McGraw-Hill's Electrical World, will retire Aug. 31 as assistant to the board chairman of Sylvania Electric Products, Inc., New York.

Ed P. Riley has been elected vice president in charge of Thompson Products' Turbine Drive, Accessories and Commercial Pump Divisions in Cleveland; and **Charles W. Ohly** is new vice president and general manager of Michigan operations. New division managers: **Pierce T. Angell**, accessories; **John B. Gates**, commercial pump, and **William P. Bente**, turbine drive.

Charles Brunell has been appointed vice president-sales of Cook Electric Co., Chicago.

Alfred A. Gassner, owner of Gassner Aircraft Engineering, is new vice president-engineering of Lunn Laminates, Inc., Huntington Station, N. Y.

Changes

Joseph Tippets has been promoted to director of CAA's Office of Federal Airways, will be succeeded as deputy director by **David D. Thomas**. Other CAA changes: **Ernest F. Hensley**, deputy regional administrator in New York; **Enar B. Olson**, assistant regional administrator in Honolulu; **Fred Novinger**, foreign assignment with the international region, and **Herbert Depue**, assistant to regional administration in New York.

August R. Tiburzi is general manager of Air Associates' new International Division, Teterboro, N. J. **P. C. Hecker** has become general manager of the eastern aviation supplies branch.

Luther Harris has been appointed general manager of the Aircraft Service Division of Lear, Inc., Santa Monica, Calif. Other changes: **Alan H. Blair**, aircraft service sales manager; **Robert Boyer, Jr.**, military sales manager of the LearCal Division.

Andrew J. Erickson has become director of Vitro Corporation of America's new armament test operation at USAF's Armament Center, Eglin AFB, Fla.

Art Lovatt, Jr., has been named industrial relations director for Pastushin Aviation Corp., Los Angeles.

Honors and Elections

Maj. Gen. John S. Mills, USAF Assistant Deputy Chief of Staff for Personnel, has been awarded the Distinguished Service Medal for "exceptionally meritorious service" while commander of the Special Weapons Center, Albuquerque, N. M., during 1951-54.

Dr. J. E. Hobson, director of Stanford Research Institute, has succeeded to the presidency of Eta Kappa Nu Assn., electrical engineering honor society.

INDUSTRY OBSERVER

► Curtiss-Wright Corp.'s T49, turboprop resulting from C-W J65 development will begin flight trials soon on a B-29 test bed at Caldwell Airport, N. J.

► **Engineering estimates say reduction in jet landing speed from 130 mph. to 115 mph. would shorten the landing distance as much as a device providing 50% reverse thrust.**

► British Overseas Airways Corp. appears to be more interested in the Conway-powered Vickers 1000, commercial version of the Valiant bomber, than it is in the Comet 4, powered by the de Havilland Gyron, a highspeed turbojet engine. Conway is a Rolls-Royce bypass engine.

► **Boeing's 707, in the event of explosive decompression, could descend at a rate of 10,000 ft./min., company engineers say. Eventually it will be possible to lower the landing gear on the Stratoliner at a speed of 350 knots (402 mph.) to serve as air brakes.**

► Pilot and co-pilot in Boeing's B-52 will eject downward while other crew members eject upward.

► **One jet transport, of the type now appearing, could replace in terms of general cargo nine to 10 C-54s, three to four C-97s, three to four C-118s and two to three C-121Cs over a 2,200 nautical mile range, says Lt. Gen. Joseph Smith, Military Air Transport commander. Smith says such a jet transport, flying 140 hours a month, can deliver about 900 passengers a month to Europe while a C-54 can deliver about 170 and a C-97 and a C-118 about 270 passengers.**

► Allison T56 turboprops are encountering operational troubles involving oil-seal failures on bearings. Allison T40 on single-engine Navy aircraft still is grounded (AVIATION WEEK Aug. 23, p. 11).

► **Military services would like to see more active participation in transport helicopter competitions by major fixed-wing transport builders. Firms such as Convair, Douglas, Boeing and Lockheed have been told by the military that their skills and experience are needed in field where commendable aggression and lamentable over-selling have been demonstrated by newer and smaller firms. Major companies are cool because of engineering and economic problems.**

► Fast-growing interest in adhesive bonding to replaced rivets and spot welding in highspeed aircraft and missiles has led Prewitt Aircraft Co. to circulate among select aircraft firms with offer to license use of its patents, processes and technical know-how. Prewitt says it has spent eight years and $2 million of government money perfecting a system that can save 15% to 30% in both cost and weight where the structure is designed for adhesive bonding. Company manufactures rotor blades but lacks facilities to take on extensive subcontracting in aircraft parts, such as flaps and missile wings that must be made without parts that vibrate loose in flight.

► **Piasecki Helicopter Corp.'s program to unground the H-21 Work Horse has progressed to the point where Royal Canadian Air Force is taking delivery on first of its six rescue ships. Company is rehiring assembly line workers hit in May layoff and new business with both Navy and Air Force appears likely. USAF is considering award of contract for turbine-powered version of first H-16.**

► Boeing's B-52 jet bomber has "met or exceeded" its performance specifications in every detail, says Air Force Secretary Harold E. Talbott.

► **Pod-mounted or fuselage-positioned turbojets in transport aircraft are favored by Military Air Transport Service because of "difficulty and certain unhappy experiences with gas turbines embedded in the wings of various aircraft," Gen. Joseph Smith says. He adds that pod-mounting minimizes structural, flutter and stability problems and reduces total weight required in the wing.**

Washington Roundup

British Competition

Next critical point of British competition in the American commercial aircraft market will be turboprops. Among the British turboprops being considered for the U. S. market are the Bristol BE-25 with 5,000 eshp., the Rolls-Royce 109 with 3,500-4,000 eshp., the Napier Eland with 3,000 eshp., and the Rolls-Royce Dart with 1,550 eshp.

In looking over current U. S. turboprop projects for airline use, airframe manufacturers are discouraged by the failure of U. S. engine makers to push development fast enough to eliminate technical bugs and to accumulate sufficient operational experience to produce an accurate index of maintenance and operations costs for commercial use.

USAF turboprop program, sparked by Roger Lewis, Assistant Air Force Secretary for Materiel, aimed at accomplishing these objectives but now appears to be bogged down again.

Retaliation Views

Air Force Assn.'s naming of John Foster Dulles as "Aviation's Man of the Year" for 1954 was based on the Secretary of State's acceptance of airpower as an instrument of national policy and threat of "massive retaliation" in case of attack. At the Omaha convention where he was honored in absentia, however, Dulles' deputy, Robert Murphy, spilled a little cold water on AFA's enthusiasm.

"Capacity for retaliation," Murphy said, "is not enough."

Warning against too great a dependence on military hardware, he suggested that more effort be put into influencing citizens behind the Iron Curtain. Murphy said it is impossible to draw a line and say an attack on the region will result in general war.

AFA, on the other hand, said the Western World should draw a line and tell its enemies they will be atom-blasted if they dare to cross it.

USAF Reorganization

Confusion resulting from Senate failure to confirm appointment of Trevor Gardner as Assistant Secretary of the Air Force for Research and Development could delay further USAF release of revised table of organization in which research and development activities are expected to reach improved status.

In a 1953 reorganization, the deputy chief of staff for development was subordinated to the deputy chief of staff for materiel. It now appears that the development deputy, Lt. Gen. Donald L. Putt, is headed toward equal status with Lt. Gen. Bryant L. Boatner, the materiel deputy.

Revised regulations—AFR 23-2 and 23-8—assure that when this is achieved the two offices will coordinate control over weapons systems and cooperate in the decision to shift prime responsibility from ARDC to AMC at the proper time.

Both deputies hold seats on the Air Force Council.

AFA Reserve Policy

Complete reversal of Air Force Assn.'s position on federalization of the Air National Guard was expressed in a convention resolution disapproving the suggestion, advanced recently at the Pentagon with a favorable nod from Defense Secretary Wilson.

A few years ago, when the AFA veterans were younger and many had just made the transition from AAF to National Guard and reserve units, the association urged federalization of ANG.

AFA's 1954 resolution lines their organization up with National Guard Assn. and various reserve groups for the coming hot-and-heavy argument over how America's minute-men should be operated.

CAA Survey Study

Colin H. McIntosh, named by Commerce Secretary Sinclair Weeks to make a thorough study of the Cresap, McCormick and Paget survey report of the Civil Aeronautics Administration (AVIATION WEEK July 5, p. 12), has divested himself of all other interests in order to devote his full time to the new assignment.

Ryan's Successor?

White House sources indicated the President is strongly considering Lyle C. Newcomber, Los Angeles attorney, as a successor to Oswald Ryan, Civil Aeronautics Board member who is expected to retire when his present term expires Dec. 31. Newcomber is a member of the law firm of Trippet, Newcomber, Yokum and Thomas, which handles the United Air Lines account in Los Angeles.

Gardner Nomination

Senate flurry over confirmation of Trevor Gardner as Assistant Secretary of the Air Force for Research and Development is expected to subside without any further fireworks. Pentagon observers predict Gardner will receive a Presidential recess appointment to serve in the newly created post until the next session of Congress, when routine confirmation appears likely.

Failure to confirm the appointment during the closing rush of the last session was the result of a misunderstanding between Sen. Bourke Hickenlooper and Majority Leader Knowland. Hickenlooper told AVIATION WEEK he had asked for a brief delay in consideration of Gardner's confirmation, but instead Knowland recommitted it to the Armed Services Committee, where it had to remain buried because the committee did not meet during the final legislative push on the bill. Hickenlooper's request was made primarily because of brief and passing reference to Gardner in Atomic Energy Commission hearings on Dr. J. Robert Oppenheimer.

AF Regulation Revision

Revised Air Force Regulations 20-10, 23-8 and 23-2, covering weapon systems project offices and the missions of Air Materiel Command and Air Research and Development Command, have modified ARDC's "cradle-to-the-grave" engineering supervision over USAF's tools of war. New rules make it clear that once a weapon system is in production, AMC is the boss—although ARDC can make recommendations on engineering change proposals. In the area of research and development, AMC gets responsibility for "necessary logistic support" in purchase of materiel for ARDC.

—Washington staff

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SALTONSTALL: Money is not important.

SYMINGTON: Spend more money.

HINSHAW: Permanency for feeders.

83rd Congress Boxscore:

Airpower Wins, Civil Aviation Plans Lose

- **Administration's 137-wing USAF program passes final session with token challenges from Democrats.**
- **Commercial air policy, spelled out by ACC, is blocked by strong opposition from legislators of both parties.**

By Katherine Johnsen

The Administration's civil aviation program confronted a wall of opposition from Republicans as well as Democrats in the recently adjourned final session of the Republican-controlled 83rd Congress. But its military airpower program glided through, ruffled only by verbal challenges from Democrats.

This year's political tenor was "let's start moving," compared with last year's "wait and see" attitude of the incoming Republican regime.

Last year, the Administration and its leadership in Congress pleaded for time to "study and review" when it suspended the buildup of a 143-wing Air Force, programmed by the Truman Administration. It asked for time to "study and review" before moving forward with airport development and other civil aviation programs.

▶ **Program**—After 1953's period of grace, a period of suspended animation for aviation, the Administration this year presented Congress concrete programs to pass on:

• **The 137-wing** Air Force program presented by the President as signalling the Administration's emphasis on airpower was welcomed heartily and supported by Republicans.

On first sight, Democrats heralded it as their victory. Their outburst at the incoming Administration's step of slashing USAF's budget by $5 billion, suspending the 143-wing buildup and establishing an "interim" 120-wing program, they contended, had forced the Administration to reverse its position.

But on second sight, Democrats decided they still were not satisfied with the program. They attacked it from two sides: It still was inadequate in airpower and did not put sufficient emphasis on ground troops—vital to fighting "bush" wars, such as Korea. The defense program, they claimed, was tailored to fit under a $30-billion appropriation ceiling.

Sen. Stuart Symington, former Air Force Secretary, did the most effective job of challenging the Administration's airpower program on the grounds that it meant a letup in research and development and in guided missiles work. The fiscal 1955 budget cuts procurement of guided missiles from $678 million in fiscal 1954 to $466 million. It reduces the USAF research and development program from $532 million in fiscal 1954 to $431 million.

In a series of floor debates with Symington, the Administration's two top stalwarts—Sens. Homer Ferguson and Leverett Saltonstall—argued that money is not the important or limiting factor. As much money as could be used wisely for research and development and guided missiles, they claimed, would be used by the Administration.

Sen. Albert Gore led the alternative Democratic attack on the Administration's defense program—as over-emphasizing strategic hydrogen and atomic attack capacity. The program was, Democrats protested, a "prepare for one type of war" program and did not put enough emphasis on ground troops and other preparation for "rim" wars.

But, despite the Democratic verbal protests, the fiscal 1955 military budget to finance the Administration's defense program, was approved by Congress essentially as recommended. Symington co-sponsored an unsuccessful amendment to boost Army funds by $350 million. No Democratic attempt was made to boost funds for USAF. Symington, at the time the Air Force budget was up for consideration, was engaged in sessions on the Army-McCarthy controversy. In his absence, no Democrat picked up the ball for USAF.

• **The Administration's** civil aviation policy, spelled out in the Air Coordinating Committee report, and other recommendations by the President to Con-

BRICKER: Rewrite the civil air law.

McCARRAN: Question bilateral agreements.

gress, was denounced or ignored. Undersecretary of Commerce for Transportation Robert Murray, credited with guiding the Administration's program, was a key target of the congressional opposition.

It was Rep. Carl Hinshaw, high-ranking Republican member of the House Interstate and Foreign Commerce Committee, who led the attack on the Administration's attitude toward local service airlines, as outlined in the ACC report. He protested that it contemplated the "gobbling up" of small lines by the trunk carriers. Without opposition, Hinshaw guided legislation to give feeders permanent certificates through the committee and the House.

In the rush to adjourn, a single senator, Prescott Bush, reportedly at the request of Commerce Secretary Sinclair Weeks, succeeded in blocking the measure by protesting its passage by unanimous consent.

Congress, however, made its position overwhelmingly clear: There should be no shift of local service routes to major airlines.

It was Republican Sen. Edward Thye who spoke out against the ACC report's recommendations on international aviation, widely interpreted as proposing the elimination of duplicative U. S. airlines on foreign routes. Thye announced he was ready to wage all-out war against such a policy (AVIATION WEEK Aug. 16, p. 379).

Subsequently, President Eisenhower declared he was no advocate of monopoly in international aviation and said he would take a second look at the ACC proposals.

The reinforced congressional opinion—openly expressed by Hinshaw—that the transmittal statement accompanying the ACC report was no more than "routine" and did not signify that Eisenhower had read the report and endorsed it.

The Administration's proposal to give Commerce Department a free hand on the allocation of federal funds for airport development was ignored by both House and Senate Commerce Committees. Of the $22 million approved for fiscal 1955 airport aid, 75% still must be allocated among the states on a population-area basis, assuring each state a portion.

▶ **Major Program**—Congress' major civil aviation program was conducted independently of Administration suggestion or approval. This was Senate Commerce Committee's consideration of the 177-page McCarran rewrite of civil aviation law, with hearings that lasted several months and brought testimony from all segments of the industry.

The project was launched early in the year by Commerce Committee's chairman, Sen. John Bricker, at a time when Bricker's antipathy toward the Administration was at a peak and his indebtedness to Sen. Pat McCarran was great. McCarran had given his weighty support to the Bricker amendment, amending the Constitution to ban treaties and executive agreements in conflict with domestic law. The all-out campaign of the Administration, led by Secretary of State John Foster Dulles, succeeded in defeating the amendment.

The amendment would put a question mark over the validity of the numerous bilateral agreements under which U. S. airlines have obtained foreign operating rights. Legal opinion is not agreed on what the effect would be.

Bricker plans to push his McCarran-supported constitutional amendment again next year, and he also plans to push a rewrite of civil aviation law, authored by McCarran. Bricker has assigned staff director Ed Sweeney to draw up a report, based on this year's voluminous testimony and a re-draft of the McCarran measure during the adjournment.

A Democratic victory that would bring Sen. Warren Magnuson into the chairmanship of Commerce Committee could change this picture. Otherwise, it appears there will be another major civil aviation program before Senate Commerce next year.

▶ **Subsidy Battle**—Other political developments which are noteworthy to aviation:

• **Subsidies** for airlines face an annual congressional battle. As expected, this was made clear this year—the first year of separation of funds for mail pay from subsidies. Congress clipped Civil Aeronautics Board's request for $73 million to finance fiscal 1955 payments to $40 million and told the Board to come back in January and justify any additional funds.

• **Civil Aeronautics Board's** grant of a direct New York City-Mexico City route to American Airlines and the failure to obtain Mexican rights for New Orleans-Mexico City route for Eastern Air Lines brought relentless criticism from Louisiana senators. The attacks will be resumed next year, probably with increasing vigor, if the situation is not resolved. Criticism of CAB by New England senators, led by Sen. Margaret Chase Smith, for delay in considering Northeast Airline's application to operate to Miami, also will be resumed next year if there are not developments in the meantime.

• **The Senate's** enthusiastic approval of the nomination of Lyle Garlock to be Assistant Secretary of the Air Force in the closing days of the session was one indication of increasing compatibility between Secretary of Defense Charles Wilson's administration and the Congress. Garlock was deputy (in charge of aircraft procurement funds for the three services) to Assistant Secretary W. J. McNeil last year when the $5-billion cut was made in USAF's budget, an action that resulted in repeated attacks being made on Wilson and McNeil last year.

• **Two key Administration** senators on military matters face re-election this fall: chairman Leverett Saltonstall of the Armed Services Committee and chairman Homer Ferguson of the Military Appropriations Subcommittee. Ferguson appears assured of re-election. Saltonstall faces a lively challenge from Foster Furcolo, a former representative and a long-time airpower advocate.

• **Joseph O'Mahoney,** defeated in 1952 after 18 years' Senate service, is back in the political picture as Wyoming's Democratic candidate for the Senate. During the past two years O'Mahoney has served as counsel of North American Airlines. A strong supporter of strategic airpower, he served as chairman of the Military Appropriations Subcommittee before his defeat.

90,000 Ft. Up

- **Bell X-1A rocket sets world's altitude record.**
- **B-29 launching rules out official recognition.**

A new unofficial world altitude record of 90,000 ft. was set by the Bell X-1A more than two months ago at Edwards AFB, Calif.

In the cockpit was Maj. Arthur Murray, assistant to the experimental flight test chief, at the Air Force Flight Test Center.

Initial announcement of the new record was made before the Air Force Assn.'s eighth annual convention at Omaha by USAF Secretary Harold E. Talbott, who told the delegates only that "an Air Force test plane has just broken the world's altitude record."

Talbott refused at a news conference to expand his disclosure on grounds of military security. He had a fairly complete report on Maj. Murray's achievement in his speech deleted by Robert B. Anderson, Deputy Secretary of Defense and former Secretary of the Navy.

▶ **35-Hr. Flight**—Talbott also announced in his Omaha speech that a B-47 Stratojet bomber of the Strategic Air Command recently flew 17,000 mi. on a nonstop flight of 35 hr. duration. The plane was from the 306th Bombardment Wing, MacDill AFB, Tampa, Fla.

Several air refuelings from Boeing KC-97 tankers made the flight possible. In addition to study of the range potential of the B-47, prime purpose of the test was to observe fatigue of the crew.

▶ **Midair Launching**—The old altitude record, 83,235 ft., was held by a Navy plane. The Douglas Skyrocket, piloted by Lt. Col. Marion E. Carl of the U.S. Marines, set the mark at Edwards on Aug. 31, 1953.

Smashing of the record by the X-1A gives the Bell plane two world records. Piloted by Maj. Charles Yeager, the rocket aircraft last winter set a world speed mark of 1,650 mph. (AVIATION WEEK Dec. 21, 1953, p. 7). Yeager recently was ordered from his post at the Flight Test Center to 12th AF Headquarters, Ramstein AFB, Germany (AVIATION WEEK Aug. 16, p. 376).

The official world altitude record is 63,668 ft., set by the British twin-jet Canberra bomber in May of last year.

The record set by the X-1A will remain unofficial, because the plane does not take off from the ground. It is launched in midair from the belly of a B-29 bomber, usually from an altitude of 25,000 or 30,000 ft. Records are not recognized by Federation Aeronautique International unless the flight starts from sea level.

▶ **Test Veteran**—Maj. Murray has been at Edwards nearly four years and was at the controls of the Bell X-5, variable-wing experimental plane, during most of its testing. A year ago, he flew that aircraft from California to Dayton, Ohio, for the National Aircraft Show in the first cross-country trip ever made by a USAF research aircraft.

A veteran combat flier of World War II, Murray has been a test pilot since he returned from overseas. In 1947 he was at the controls of the XF-86 that made the first air-to-air hookup with a B-29 refueling tanker. He served as an escort pilot for the Bell X-1 during its tests at Edwards AFB and flew the XB-43, USAF's first jet bomber.

Lockheed 1049G Goes Into Production

Burbank, Calif.—Lockheed Aircraft Corp. has put the 1049G Super Constellation into production following an order from KLM Royal Dutch Airlines and Air France for 12 of the latest Connie model.

Lockheed reports the new contracts increase the total number of Constellations built or on order to more than 570, including 153 Turbo Compound-powered Super Connies.

The company says 107 new design features are incorporated in the G series. The most distinctive of these is wingtip fuel tanks for extended range (AVIATION WEEK Aug. 23, p. 14).

▶ **Sacrificed Speed**—Some airlines with orders for current model Super Constellations are having them converted to the G series on the assembly line. This involves seven airlines and 38 transports.

Apparently they are buying increased range with a slight sacrifice in speed. The maximum cruising speed of the 1049E is 356 mph., whereas the G series will cruise at 335 mph. maximum.

The new passenger airliner will feature two 600-gal. teardrop-shaped tiptanks that provide up to 850 mi. more range, thereby eliminating some fuel stops and shortening travel time on long-haul routes.

With a 7,750-gal. total fuel capacity, its maximum distance capability will be 4,620 mi. with reserves, or 5,840 mi. absolute.

"The extra range potential will be particularly valuable westbound across the Atlantic against headwinds," says Leonard K. Schwartz, director of commercial sales. "Against average 55-mph. headwinds, for example, a 3,460-mi. nonstop route becomes the same as a 4,160-mi. trip in still air. That's when 850 mi. more range pays off."

▶ **Increased Gross**—Payload will not suffer, according to Lockheed, because of the range bonus. Improved engines and landing gear provide for a maximum gross takeoff weight of 137,500 lb., compared with 135,000 lb. allowable gross takeoff weight at present.

The major factor contributing to the increased takeoff weight is power gained by the four 3,250-hp. Wright DA3 Turbo Compound engines. Each develops 100 more horsepower for climbing than DA1 Turbo Compound engines in use.

▶ **TWA Fleet**—Trans World Airlines' new fleet of 20 Super Connies will be the 1049G, with delivery starting early in 1955. Northwest Orient Airlines will receive the first of four about the same time. Air France has purchased nine and KLM has three on order with an option on a fourth.

TWA's new models will be equipped with weather surveillance radar, enabling the pilot to foresee rough weather and fly around or over storms.

Other advances in the 1049G:

- **Improved interior acoustics.** New soundproofing materials are being used in the walls, floors and ceiling.
- **Braking efficiency increase** by 12½%. Drum width is being enlarged from four to four and a half inches.
- **Landing weight** is being raised from 110,000 lb. to 113,000 lb.
- **More passenger payload.** Large 83-ft.-long passenger space will accommodate approximately 15% more than its nearest competitor.
- **Convertible interior.** As operators require, interiors can be changed from a multi-compartmented luxury plan to a high-density aircoach version.
- **Passenger payload increase.** Model G can accommodate up to 24,300 lb. of payload across the U.S. or 23,500 lb. on overseas flights (coach seating).

Convair's XB-58 Gets Brushless Generator

A novel design aircraft generator slated for service in Convair's XB-58 Hustler supersonic bomber will be displayed for the first time next week at the National Aircraft Show in Dayton, Ohio.

It is an oil-cooled, brushless, 40 kva. a. c. unit, using high-temperature, rotating silicon rectifiers in place of brushes, commutators and slip rings, an important factor to minimize maintenance. Engine oil will be used as the coolant.

While no identification of aircraft application has been made by the manufacturer, Westinghouse Electric Corp.'s Small Motor Division, Lima, Ohio, first tieup of the equipment to the Hustler was made by AVIATION WEEK (June 7, p.11).

Experts Call for Stronger Defense

Scientists warn AFA of need for new aircraft, avionic developments to offset growing Red nuclear threat.

By Claude Witze

Omaha—America's aircraft and avionics industries must put new emphasis on the problems of continental defense, particularly in the area of research and development, if the nation is to survive in the face of Russia's growing nuclear ability, two top scientists told the Air Force Assn. at its eighth annual convention here last week.

Dr. Mervin J. Kelly, president of Bell Telephone Laboratories, said defense capabilities, "at the present level of the technology, cannot be as high as our country must have to insure its survival. . . .

"There is still much research and development required to adequately narrow the gap between attack at its present level of technology and defense."

▶ **Offense-Defense**—Donald A. Quarles, Assistant Secretary of Defense for Research and Development, said our postwar research and development program has been dominated by nuclear weapons and their delivery to a target. Far from discounting the importance of this at the home of Strategic Air Command headquarters, Quarles said it was the proper thing to do, but added:

"As our potential enemy builds up similar offensive capabilities, we must recognize the interplay between the offense and the defense. The Russian capabilities for nuclear attack against our homeland must be met not only by a threat of massive retaliation but also with a balanced defensive position."

Adding force to the scientific warnings, Rep. W. Sterling Cole, chairman of the Joint Congressional Committee on Atomic Energy, declared that continental defense "may well represent the greatest and most difficult national security problem ever faced by our country."

▶ **Equipment Needs**—All three speakers appeared at the annual AFA airpower symposium. The subject this year was "Security in the Hydrogen Age." Fourth member of the panel was Robert D. Murphy, Deputy Undersecretary of State, who discussed diplomatic aspects of the problem.

Principal conclusion reached by the symposium was that Gen. Benjamin Chidlaw's new Continental Air Defense Command—which will integrate efforts of the Army, Navy, Air Force and National Guard (AVIATION WEEK Aug. 9, p. 18)—must have improved equipment to give complete protection.

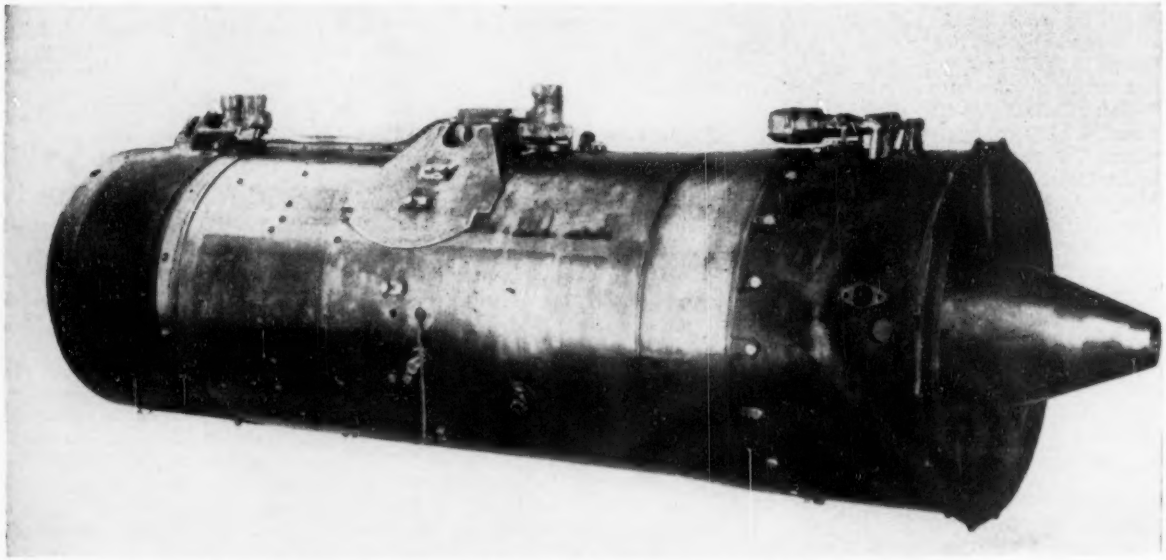
▶ **Tremendous Red Strides**—Both Dr. Kelly and Quarles admitted the Russians have made tremendous strides to overcome America's advantage in nuclear weapons.

The Soviet, Dr. Kelly said, "has made steady progress and the gap between our strategic atomic strike capabilities and that of the Russians has steadily narrowed."

Quarles declared that, while we "have led the Soviets in every important postwar technological breakthrough, we must be very cautious in assessing the margin of our advantage. My own appraisal is that we are in a race where our best is none too good."

The Bell Telephone Laboratory president made specific suggestions as to the fields where research and development challenges exist:

- "The air defense technology has now reached a level that clearly justifies the large capital outlay required for the establishment of a comprehensive integrated system. Its effectiveness, at the present level of the technology, cannot be as high as our country must have to insure its survival. The improvements will come if we maintain an adequate level of effort in the science and technology of the area."
- The early-warning network "must have electromagnetic eyes that see from ground zero to heights as high as planes of missiles can fly. Technology does not yet permit this requirement to be met in all respects."
- Attacking planes and missiles should be intercepted and destroyed as far as possible from our cities. "There still is a great distance to go" before this will be possible.
- During World War II, radar observations used to direct defensive air battles were interpreted and dispatched



New Rolls-Royce Baby Jet Produces 1,810 Lb. Thrust

Latest Rolls-Royce "River class" aircraft turbine is the 1,810-lb.-thrust Soar, slated for exhibition at the Society of British Aircraft Constructor's annual show at Farnborough Sept. 6-11. The axial-flow Soar has passed a type test at 1,860 lb. thrust. Weight is only 267 lb. The new turbojet measures 15.75 in. diameter, 62.75 in. long. Construction appears to be relatively simple.

by manual means. Automatic electronic computers now can be used for this work and are taking much of it over, but further advances are necessary.

• We must assume that the potential enemy will continue to improve his methods of attack. This is another reason for pressure in the field of research and development that will produce better defenses. "We must spend large amounts of capital to fully establish the system."

▶ **'Brush-Fire Wars'**—Quarles indicated that more of the R&D effort also must be devoted to the problem of fighting little wars, which keep cropping up at isolated points while nearly all of the effort is devoted to weapons systems designed for intercontinental warfare.

"In addition to meeting the threat of air atomic war," he said, "there is also the need for research and development directed toward fringe conflicts, the so-called brush-fire wars.

"The events of recent years have clearly indicated that the Soviets would prefer to accomplish their ultimate aims by a piecemeal gnawing-away at the free world and we must not neglect this aspect of the threat."

MATS Adopts Airline Supply Plan

Logistics system is set up for 15 Convair C-131Ds, may be used for other fleet transports if successful.

By G. J. McAllister

Military Air Transport Service has adopted a new logistics plan for spare parts—patterned after the commercial airlines system—for the support of 15 Convair C-131Ds, first completely "off the shelf" transport purchased by USAF.

The logistics plan works this way:

• All spares peculiar to the aircraft, including those supplied to Convair by vendors, will be obtained directly from Convair at San Diego instead of through the Air Materiel Command system.

Items common to all USAF aircraft, such as certain bolts and washers, will be supplied through regular AMC channels. However, this accounts for only a minor portion of the total spares requirement.

Only exception will be high-value items requiring a lead time not exceeding one year.

• Initial provisioning of aircraft spares and spare parts will be for 120 days, compared with the usual USAF procedure of procuring a 17-and-a-half month supply at the time of purchasing the aircraft.

• The plan utilizes a "call" type contract, which previously has been funded, and requirements will be made against it.

Advantages of the plan, according to MATS, are:

• Less initial investment.

• In-pipeline time for spares is reduced to a minimum.

• Less storage space requirement.

• Curtailment of the possibility of overstocking.

• Aircraft, in an emergency, can obtain parts from any base used regularly by 340s in commercial service.

When the decision was made to buy the C-131D, military designation for the Convair 340, the spares plan was developed jointly by MATS and Convair. It was approved by USAF Headquarters.

USAF purchased 33 C-131s (Aviation Week Aug. 23, p. 17) and assigned 15 to a MATS transport squadron based at Bolling AFB, Washington, D. C., for domestic service only. The balance will go to other continental Air Force commands such as Air Research and Development Command, Air Defense Command and the Tactical Air Command.

First two planes were scheduled for delivery this month and the balance by March 1955.

A plan to extend the new spares supply concept to a portion of the other 18 aircraft still is being discussed.

▶ **Airline Experience**—Opportunity for using the concept was ideal, since there is a vast amount of experience data available from commercial operators.

A MATS team analyzed spares consumption data accumulated by National Airlines in the operation of NAL 340s, which totaled about 11,000 hr. The team later evaluated the mass of information collected by Convair from the 28 airlines flying Convair 340s and 240s in world-wide operations.

▶ **Simple Procedure**—The spares plan, at the operating level, is simple.

The MATS squadron makes its spares request to the Bolling AFB supply officer. If the item is needed urgently but not in Bolling stocks, a teletype request is sent to Convair and the item is delivered to the squadron by air. The part is charged against the "call" contract and documents submitted to the San Antonio Air Materiel Area for payment.

SAAMA has prime support responsibility for Convair aircraft. The request is mailed to Convair by Bolling if it is for stock replenishment. This parallels the procedure used by commercial Convair customers.

Repair and overhaul of all accessories and components peculiar to the C-131D will be handled by commercial contract. Exceptions are engines and propellers, which will be overhauled by AMC. The C-131D uses the Pratt & Whitney Aircraft R2800-130W, military version of the commercial R2800-CB16.

▶ **Review Plan**—Monthly records of parts consumption will be maintained by the squadron and consolidated at MATS headquarters using IBM techniques. The experience data will be evaluated each month.

Both AMC and MATS are watching the program closely and, based on experience, will determine if the new logistics plan can be utilized successfully in other new transport aircraft joining the MATS fleet.

MATS has used the procedure of obtaining spare parts directly from the manufacturers of other transport aircraft when conditions have made it advantageous. In addition, Lt. Gen. Joseph Smith, MATS commander, has emphasized using commercial facilities in the repair and overhaul of parts and accessories when such action speeds the return of aircraft to operating condition.

Aircraft Expenditures Set Postwar Record

Fiscal 1954 expenditures for aircraft and related procurement by Air Force and Navy climbed to an unexpected $9.3 billion, setting a post-World War II record.

Defense Department's original program anticipated an expenditure of $8 billion: $6 billion by USAF and $2 billion by Navy. The department's final calculation shows USAF expenditures for the year reached $6.9 billion, and Navy expenditures $2.4 billion.

▶ **Big Balance**—The upward trend in expenditures is expected to continue in fiscal 1955 as the big unexpended balance in procurement funds—$22.2 billion at the end of 1954—is used to pay for deliveries contracted for in previous years.

The unexpended balance: USAF, $15.9 billion; Navy, $6.3 billion.

This is the expenditure picture on aircraft and related procurement since the build up started in mid-1950 after the outbreak of the Korean war:

• **Fiscal 1951:** $2.5 billion, $1.9 billion by USAF and $591 million by Navy.

• **Fiscal 1952:** $5.6 billion, $4.3 billion by USAF and $1.3 billion by Navy.

• **Fiscal 1953:** $8.6 billion, $6.5 billion by USAF and $2.1 billion by Navy.

In fiscal 1954, obligations for aircraft and related procurement plunged to $2.4 billion from $12.4 billion in fiscal 1953. These are "net" figures, reflect-

ing gross obligations after de-obligations have been deducted.

The low net obligation for 1954 was due to large-scale deobligations resulting from "bookkeeping" changes as well as contract cancelations. For example, the criteria for determining what constitutes a bona fide "obligation" were tightened at the direction of the General Accounting Office.

▶ **Sharp Rise**—Defense Department officials predict a sharp rise in obligations during fiscal 1955, following adjustments in the aircraft program by the new administration in 1954. (AVIATION WEEK July 26, p. 10).

Fiscal 1954 obligations by USAF totaled $1.6 billion; by Navy, $756 million.

Unobligated funds on hand at the end of the fiscal year amounted to $5.8 billion.

This sum was divided: USAF, $4.7 billion; Navy, $1.1 billion.

Obligations over the three previous mobilization years, showing a peak in fiscal 1952, were:

- **Fiscal 1951:** $10.5 billion, $7.4 billion by USAF; $3.1 billion by Navy.
- **Fiscal 1952:** $14.5 billion, $10.6 billion by USAF; $3.9 billion by Navy.
- **Fiscal 1953:** $12.4 billion, $9.3 billion by USAF; $3.1 billion by Navy.

Aircraft Firms Again Eligible for Writeoffs

Office of Defense Mobilization last week told the military aircraft and electronics industries they are again eligible for fast tax writeoffs and, at the same time, instituted a new program to cover mobilization needs in case of war.

Manufacturers must prove a need for facilities and that they are essential to fill defense contracts for the military services or the Atomic Energy Commission.

ODM said the application also must be supported by their investigation to show that an actual shortage exists.

In a second order, designed to maintain production facilities so that no time will be lost if full production is needed in an emergency, ODM ordered Defense Department, AEC and the Maritime Commission to select the plants they believe would be essential.

The items produced must meet one or more of these criteria:

- Require a long lead time or time for manufacture.
- Be currently out of production or required in much larger quantities in case of war.
- Require conversion of an industry or a number of plants.
- Require materials or processes essentially different from those now in use.
- Require production experience that industry does not have.

The order sets up a defense facilities maintenance board under the chairmanship of ODM to recommend additional policies and procedures that may be necessary to carry out the program.

In addition to current contracts, the order says plants will be maintained in standby status where necessary. Government-owned tools will continue to be stored at or near plants where they will be used.

YC-130 Flight

Edwards AFB, Calif.—Lockheed Aircraft Corp.'s YC-130 turboprop transport made its first flight last week, taking off from Burbank for a 60-mile hop to this Air Force Flight Test Center.

Pilot Stanley Beltz took the big 132-ft.-wingspan transport off the runway in little more than a third the distance ordinarily required for aircraft of its size.

"The tremendous acceleration of turboprops, plus design for short field operation make this a highly significant new tool for the Air Force," said Lockheed's engineering vice president, Hall L. Hibbard.

The turboprop transport is powered by four Allison T56 engines with Curtiss-Wright Turbolectric propellers.

New Oerlikon Missile To Start Tests Soon

Oerlikon Tool & Arms Corp. of America says no production order for their Swiss-designed guided missile has been given, pending tests of a new version in the near future.

Twenty-five missiles manufactured abroad by parent company, Oerlikon Machine Tool Works of Zurich, have been evaluated at Holloman AFB, Alamogordo, N. M.

The Oerlikon missile is 16 ft. long, 3 ft. 5 in. in diameter and has a wingspread of 4 ft. 3 in. Weight is given as 545 lb. Electronically guided, the missiles can reach 852 mph. and are designed for ground-to-air use.

A spokesman for the American company, with headquarters in Asheville, says Oerlikon has promised USAF that the weapon will be sold exclusively to Western powers.

New Cessna Light Copter Undergoes CAA Tests

Cessna's new CH-1 all-metal copter is seen aloft during part of its Civil Aeronautics Administration certification program, expected to be completed shortly. Weighing 3,000 lb. gross, it has a 35-ft.-diameter, two-blade main rotor and a two-blade tail rotor. The 260-hp. Continental is mounted ahead of the cockpit. There is space behind the pilot and co-pilot for cargo.

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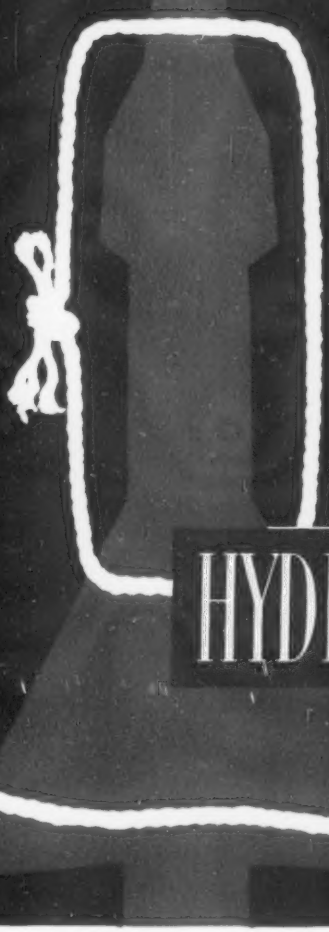

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▶ **Hotter Air**—Hot air needed to test turbines and jet engines, for example, must be supplied at ever increasing temperature ranges. A year ago 800 degrees F. was considered adequate. Today, Hydro-Aire's huge heater and compressor facilities supply hot air at more than 1300 degrees F. and at much higher pressures than are required to test present equipment.

▶ **Analog Added**—In one of the largest "cold boxes" of its kind, Hydro-Aire units are tested at minus 100 degrees F. and lower. A large salt spray box tests units for resistance to the particular condition. Among the new equipment added to the laboratory: a large analog computer, an electronic "brain" to aid in turbine research.

"Today", states H. H. Rhoads, President of the Company, "Hydro-Aire's Engineering and Research Laboratory is one of the best-equipped in the world. It requires constant change and improvement to keep it that way."

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LOS ANGELES

Mid-Air Crash

- **F-80C, F-94C collision shows rugged strength.**
- **Both fighters land safely despite severe damage.**

Ruggedness of U. S. jet fighters, built to take severe loads in highspeed maneuvers, was demonstrated dramatically when a USAF Lockheed F-80C and a F-94C collided in mid-air recently. The crash resulted in severe damage to the planes—but both landed safely.

The photos provide an on-the-spot view of how the Lockheed F-94C fared. After the Starfire landed, the pilot said that had he seen the damage sustained by his plane, he would have climbed out and walked home.

▶ **Lockheed Report**—Here is a verbatim account as reported by Lockheed Aircraft Corp.'s representative.

"On 6-18-54 at approximately 1045 hours (8:45 p.m.) F-94C aircraft, serial number 51-558, was flying at an approximate 20,000-foot altitude when what pilot described as an explosion occurred. At the same time, F-80C aircraft, serial number 49-505A, was also flying in the same area (approximately 45 miles south of McClellan Air Force Base) at an estimated 20,000-foot altitude, when he made a bank to the right and found himself looking up the scoop of the F-94C and approaching rapidly.

"The pilot of the F-80 immediately took evasive action by lowering the nose of his aircraft and heading for the deck. However, he was unable to avoid striking the F-94C. Major damage was sustained by both aircraft.

"The F-80 returned to McClellan Air Force Base with approximately five feet of the left hand wing tip gone (from approximately wing station 169 to wing station 234), including the center-line mounted tip tank. The outboard wing fuel cell had been torn from its cavity and all aileron control was jammed. A safe landing was made, however, in spite of these obstacles.

"The F-94C pilot, never having seen the F-80, assumed he had had an explosion in the aft section and returned to Hamilton Air Force Base, where a safe landing was made. The damage sustained by the F-94C is evident. The afterburner and drag chute were lost; the radio was rendered inoperative, and the aft dive brakes were out.

▶ **75-Degree Angle**—"As nearly as the accident can be reconstructed, the two aircraft were approaching at an angle of approximately 75 to 80 degrees when the F-80 started a bank to the right. As the right wing dropped, the F-94C became visible to the F-80 and the pilot immediately executed evasive action.

He was unable to completely miss the F-94C, however, and struck that aircraft with his left hand tip tank at approximately fuselage station 277 left hand, passing clear through the aft fuselage of the F-94C, taking virtually all of that section including the aft afterburner and the drag chute and in the process lost the tip tank and approximately five feet of the F-80's left hand wing tip.

It might be interesting to note here, however, that the pilot said the F-94C aircraft cruised very nicely at 80% on his return to Hamilton, in spite of the fact that virtually all of the tail pipe was gone. He also mentioned that had he been able to see the damage sustained by his aircraft, he would have got out and walked home."

LOCKHEED F-94C aft fuselage is chewed off right up to powerplant turbine wheel.

CLOSEUP shows how close USAF fighter came to losing entire tail in the collision.

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Sabena Copter Clips Regular Route Time

(McGraw-Hill World News)

Brussels—British European Airways, caught off balance by a nonstop Sabena helicopter flight that clipped three-quarters of an hour off scheduled Brussels-London time, is taking a new look at the copter's role on routes to Europe.

The Belgian airline's Sikorsky S-55 flew past London's Big Ben and landed on the south bank of the Thames River two hr. 51 min. after it took off from Brussels, cutting 44 min. off fixed-wing transport time.

Sabena operations manager Anselm Vernieuwe, who piloted the flight, forecast that larger helicopters of the future would fly from Brussels to London in 70 min. and Paris-London in 75 min.

▶ **Fresh Inspection**—Shortly after the Vernieuwe flight, BEA chairman Lord Douglas of Kirtleside arrived here for talks with Sabena chairman Gilbert Perier and a fresh inspection of the Belgian airline's international copter services. With him were John D. Profumo, parliamentary secretary to Britain's Minister of Civil Aviation, and Sir George Cribbett, permanent secretary of the Ministry.

They noticed the simplicity and ease of operation of the small city center heliports, run as one-man jobs. These installations do not have air traffic control, considered unnecessary for Sabena's fleet of four S-55s. Nor do they have fire fighting crews on standby.

The British delegation also began to appreciate Sabena's conception of the copter as an airborne bus. BEA's experimental helicopter passenger service, in operation for the past two years, has treated rotory-wing craft as miniature airliners.

▶ **Copter Safety**—The British disagreed with the Belgians on safe helicopter operations. BEA is more concerned than Sabena with the man on whom a copter might crash.

British European's chairman also indicated he believes there is a chance that a rotor blade will break off shortly after taking off or landing at a heliport in a congested area.

Another BEA-Sabena difference was on the limit of future copter usefulness. Sabena suggests helicopters as the replacement for fixed-wing transports over European routes within the next few years. But BEA believes the route limit never will be much more than 250 mi.

Thousand-mile flights, such as London-Rome, always will be quicker and easier by regular airliners, Lord Douglas said.

▶ **Copter Noise**—But the British group and Sabena officials agreed on the outstanding problem of helicopter noise, a

Copter Moves Own Hangar

In a Marine demonstration at Quantico Va., geodetic frame for 2,000-sq.-ft. hangar is lifted by Sikorsky HRS helicopter to show structure's lightness. Made of magnesium extrusions held together with 360 bolts, the frame weighs about 1,200 lb. and will be covered by vinyl-coated glass cloth weighing 350 lb. Marines say the new hangar is lighter and cheaper than tents, can be airlifted at speeds up to 60 mph. assembled. Navy's BuAer has ordered a design for a similar 114-ft., six-plane hangar.

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barrier to operations both here and in London.

In Brussels, noise was one of the reasons the city council ordered Sabena not to use the roof of its new terminal building as an airport. The airline was forced to choose a site close to no important buildings and therefore far from the business district.

In London, copters must fly along the Thames River, passing close to the seat of local government, the houses of Parliament and the palace of the Archbishop of Canterbury.

Profumo said he gets a stack of complaints from Parliament and other sources every time a helicopter lands.

▶ **BEA Expansion?**—Lord Douglas would not indicate how much he planned to expand BEA's experimental Liverpool-Cardiff and Southampton-London Airport routes in the near future.

Until transport copters are available for commercial service, British European probably will have to operate such services at a loss. And, unlike Sabena, BEA will have no gain to offset this deficit.

The Belgain airline estimates its copter loss at $500 for each 1,900 passenger-miles flown on the average day but tries to make this up by using every available S-55 for charter flights.

SEC Lists Aviation Stock Transactions

Paul Moore, director of Republic Aviation Corp., sold 30,000 common shares in the company last June, according to Security & Exchange Commission's survey of stock transactions for that month.

The disposal reduced Moore's holdings to 177,220 common shares.

Other transactions reported in the survey:

Air Associates, Inc. Disposal by Fred A. Twomey, officer, of his total holding of 1,000 shares.

Air Reduction Co. Acquisition of 200 common shares by Charles de Wolf Gibson, director, making a total holding of 1,200; purchase of 300 common shares by Douglas Steimle, director, making a total holding of 1,000 shares; acquisition of 900 common shares by Louis Ware, director, making a total holding of 1,000 shares.

Allis-Chalmers Manufacturing Co. Acquisition of 500 common shares by W. A. Roberts, director, making a total holding of 1,700 shares.

Aluminum Company of America. Acquisition of 18,900 common shares by I. W. Wilson, director, making a total holding of 29,100; purchase of 10,000 common shares by Leon Hickman, director, making a 14,000-share holding; acquisition of 7,000 common shares by M. M. Schratz, officer, making a total holding of 11,000; acquisition of 400 common shares by B. M. Hosler, officer, making a total holding of 620.

American Airlines. Acquisition of 400 common shares by A. R. Bone through exercise of option, making a total holding of 2,000.

Aro Equipment Corp. Purchase of 403 common shares by Ralph McConnell, director, making a total holding of 7,791 shares.

Avco Manufacturing Corp. Acquisition of 500 capital and 200 preferred shares, by Thomas O'Hara, director, making a total holding of 1,595 capital and 235 preferred.

Beech Aircraft Corp. Acquisition of 200 common shares by Lynn Richardson, making a total holding of 400 shares.

Bell Aircraft Corp. Acquisition of 7,500 common shares through exercise of an option by Ray Whitman, director, making a total holding of 10,500.

Bendix Aviation Corp. Purchase of 100 common shares by Marvin Heidt, officer, making a total holding of 122 shares; acquisition of 150 common shares by George Stoll, director, making a total holding of 257.

Capital Airlines. Acquisition of 1,000 common shares by James Stockton, director, making a total holding of 1,550.

Colonial Airlines. Acquisition of 1,000 common shares by Joseph Shields, director, making a total holding of 1,500; purchase of 100 common shares by L. Orville Cameron, officer, making a total holding of 500.

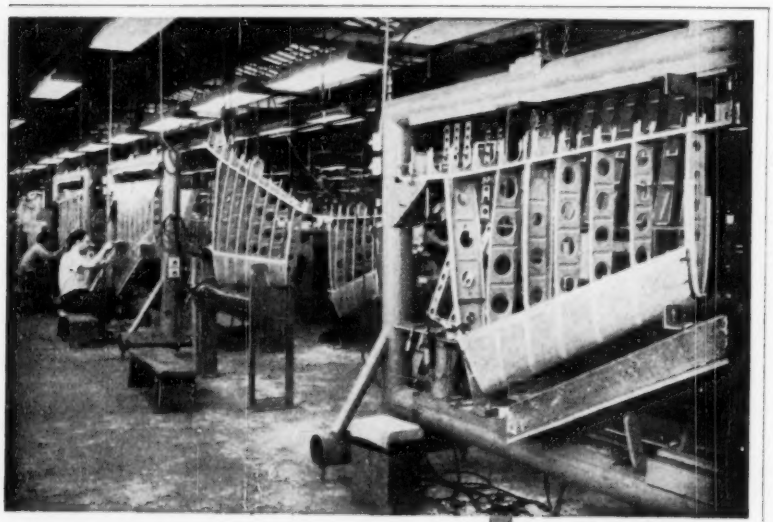
Convair Division of General Dynamics Corp. Disposal of 1,800 common shares by Raymond Sebold, officer, leaving a holding of 1,000 shares.

Douglas Aircraft Co. Acquisition of 450 common shares by Nathaniel Paschall, director, making a total holding of 750 shares; purchase of 300 common shares by Lawrence Tollefson, officer, making a total holding of 320.

Eastern Air Lines. Sale of 200 common shares by Stuyvesant Peabody, director, leaving a holding of 300.

Emerson Electric Manufacturing Co. Acquisition of 3,300 common shares by Elton Investment Corp., making a total holding of 70,800 shares.

Firestone Tire & Rubber. Disposal of 100 common shares by Harvey Firestone, director, leaving a holding of 27,768; disposal of 2,000 common shares by John Shea, director, leaving a holding of 14,000 shares; acquisition of 1,500 common shares by H. H.



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Hollinger, director, making a holding of 7,470; acquisition of 2,700 common shares by Harold Tompkins, officer, making a total holding of 4,370.

General Dynamics Corp. Acquisition of 2,000 common shares by Lambert Gross, director, making a total holding of 2,057; purchase of 5,000 common shares by Clifton Miller, director, making a total holding of 6,335 shares; disposal of 300 common shares by Andrew McKee, officer, leaving a holding of 2,510.

General Electric Co. Sale of 133 common shares by John Belanger, officer, leaving a holding of 1,000 shares.

General Tire & Rubber. Disposal of 5,600 common shares by Investors Mutual, Inc., leaving a holding of 1,400 shares; acquisition of 204 common shares by Dan Kimball, director, making a holding of 610 common shares.

B. F. Goodrich Co. Purchase of 1,478 common shares by J. W. Keener, officer, making a total holding of 4,212 common shares.

Lear, Inc. Acquisition of 355 common shares by Roy Benecchi, officer, making a total holding of 703 shares.

Pan American World Airways. Disposal of 100 common shares by Alvin Adams, officer, leaving a total holding of 473 shares.

Raytheon Manufacturing Co. Acquisition of 375 common shares by Stanley Lovell, director, making a total holding of 1,000 shares.

Reynolds Metals Co. Purchase of 127 common shares by I. P. Macauley, director, making a total holding of 1,426 shares.

Rheem Manufacturing Co. Sale of 600 common shares by W. K. Rheem, leaving a holding of 3,129 shares.

Ryan Aeronautical Co. Acquisition of 1,200 common shares by Emtor, Inc., making a total holding of 86,300 shares.

Seaboard & Western Airlines. Disposal of 2,500 common shares by Arthur Norden, director, leaving a holding of 31,021 shares; acquisition of 1,800 common shares by John Rosenwald, officer, making a total holding of 53,475 shares.

Sperry Corp. Purchase of 3,200 common shares by Thomas Doe, director, making a holding of 3,700; sale of a total holding of 1,100 common shares by Charles Green, officer.

United Air Lines. Disposal of 300 common shares by Martin Ansorge, director, leaving 201 shares.

United Aircraft Corp. Acquisition of a total holding of 300 common shares by Richard Tayloe, director.

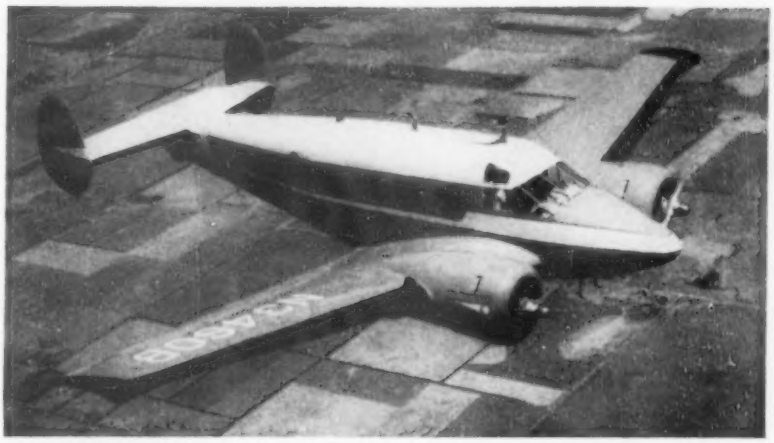
United Aircraft Products. Acquisition of 200 common shares by Robert Hart, director, making a total holding of 721 common shares.

Westinghouse Electric Corp. Acquisition of 5,000 and disposal of 3,610 common shares by Gwilym Price, director, making a holding of 6,084 shares; purchase of 1,225 and sale of 851 common shares by Mark Cresap, officer, making a holding of 1,464 shares; acquisition of 900 and disposal of 432 common shares by E. V. Huggins, officer, making a total holding of 1,127 shares; acquisition of 600 and sale of 558 common shares by W. O. Lippman, making total holdings of 1,542 shares; disposal of 200 common shares by A. W. Robertson, director, leaving a holding of 500 shares; disposal of 299 common shares by William Rowland, officer, leaving a holding of 541 shares.

Weston Electric Instrument Corp. Purchase of 55,000 capital shares by Daystrom, Inc., making a total holding of 171,000 shares.

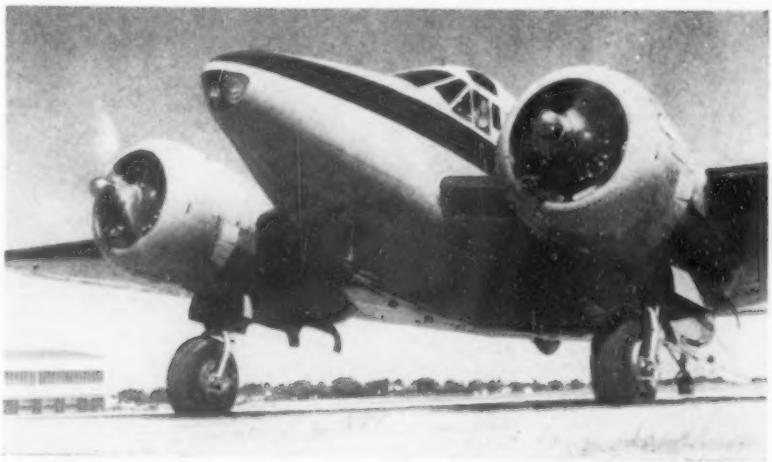
AA Declares Dividend

American Airlines has declared a 15-cent dividend on common stock shares, payable Sept. 20 to holders of record Sept. 7. The company also will pay a regular quarterly dividend of $.875 on $3.50 cumulative convertible preferred Sept. 1 to stockholders of record Aug. 16.



LARGE WINDOWS—four on each side, in place of former three—and deeper fuselage on new 234-mph. Super 18 give improved view, roomier, more comfortable cabin.

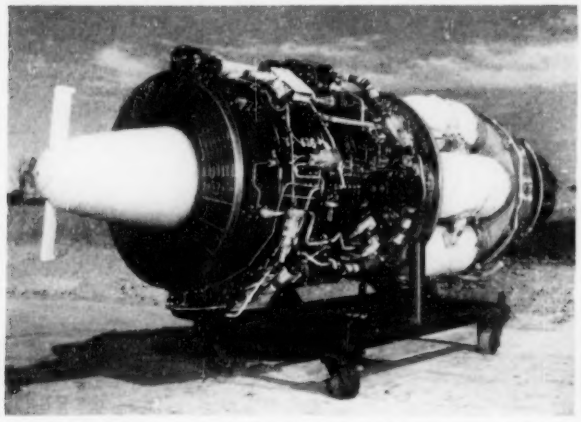
Beech Starts Super 18 Deliveries

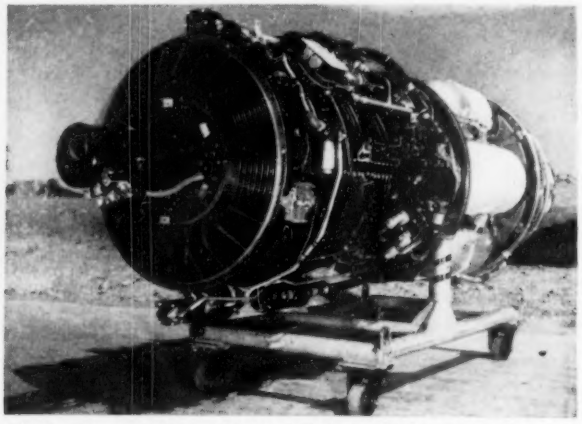


REDESIGNED NOSE houses radio equipment, accessible by removing top panel. Engine assemblies are interchangeable. Beech has $4 million-plus Super 18 backlog.

DOOR-STEP installation provides a larger entrance area than formerly.

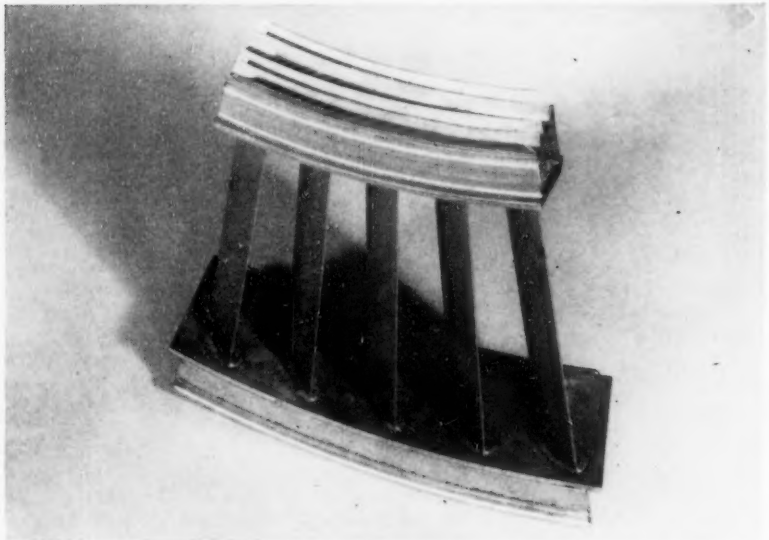
TAIL-WHEEL STRUT is longer for better landing attitude, visibility.



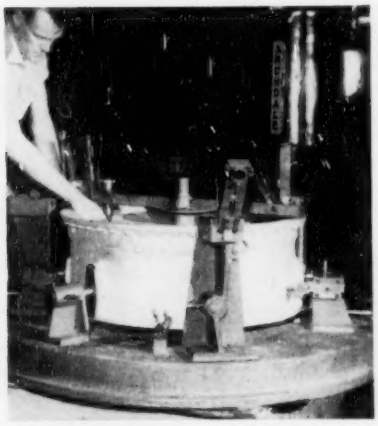


AVRO ORENDA has nose fairing with alcohol-spray booms (left) for intake screen anti-icing. Engine (right) has fairing removed.

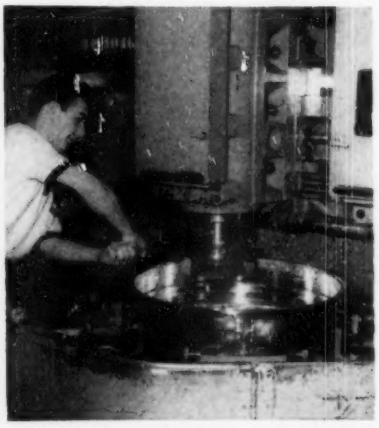
Avro Canada Pushes Jet Developments



NOZZLE SEGMENT for two-stage turbine. Blades are brazed to sheet stampings.



INTAKE CASTING set for operation on Archdale radial drilling machine.



COMPRESSOR CASING has inside surface machined on vertical turret lathe.

By Irving Stone

Malton, Ont.—Backbone of the Canadian jet engine industry is A. V. Roe Canada Ltd.'s Gas Turbine Division.

The division has created an impressive engineering and manufacturing record with its Orenda turbojet, present production engine powering the Avro CF-100 and scheduled for the Canadair-built Sabre Mk. 6.

Avro promises still greater achievements with a new experimental engine targeted for 18,000 to 20,000 lb. thrust, and scheduled to run this winter (AVIATION WEEK, June 14, p. 11).

▶ **More Thrust, Less Weight**—A notable design and production improvement Avro has worked into the Orenda is a two-stage turbine for the most recent models of the series—the 11 and 14. This jump from a single to a twin turbine, with a considerable boost in thrust, has been accomplished with no increase in length over the basic Orenda configuration.

More important, it was done with a weight slash that lopped 140-150 lb. from the engine. Key to this accomplishment is the use of sheet metal components instead of castings, where possible, in the aft portion of the engine.

▶ **Hot-End Makeup**—Rearward of the center bearing, the design is completely new. To accommodate the second-stage wheel, the backbone casting and stub shafts were shortened and a bit of the tailcone was stolen. The turbine nozzle consists of investment-cast blades with flanged roots fitting into sheet metal stampings on the inner and outer ends.

Outer end is supported by a machined forging, inner portion by sheet

metal flanges. The entire assembly is joined by the Nicrobraz process. There are 14 nozzle segments of five blades for each stage.

▶ **Engine Details**—The Orenda 11 is going into recent CF-100 Mk 4s. Delivery of this engine series was started in April and rate buildup has been in line with aircraft requirements. Weight of the engine is about 2,405 lb.; minimum guaranteed thrust about 7,000 lb.; tailpipe temperature about 690C.

The Orenda 14 is tagged for the Canadair-built Sabre Mk. 6s. Delivery of the engine to meet the Sabre program is scheduled for September. Weight of the engine is about 2,425 lb.; minimum guaranteed thrust is 7,275 lb., but about 7,400 lb. is expected; tailpipe temperature about 715C.

A further stretchout still is projected for the Orenda within the existing dimensions and weight. Target is a thrust of about 8,000 lb. Changes contemplated include an increase of present mass flow (114 lb./sec.) by changing early stages of the compressor. The 8,000-lb.-thrust engine may be available by the end of 1955.

Cost of producing the Orenda is approximately $9 per lb. of thrust.

▶ **Three Activities**—Avro's Gas Turbine division is split into two main facilities —the production section (plant 1), and engineering and experimental manufacturing (plant 2).

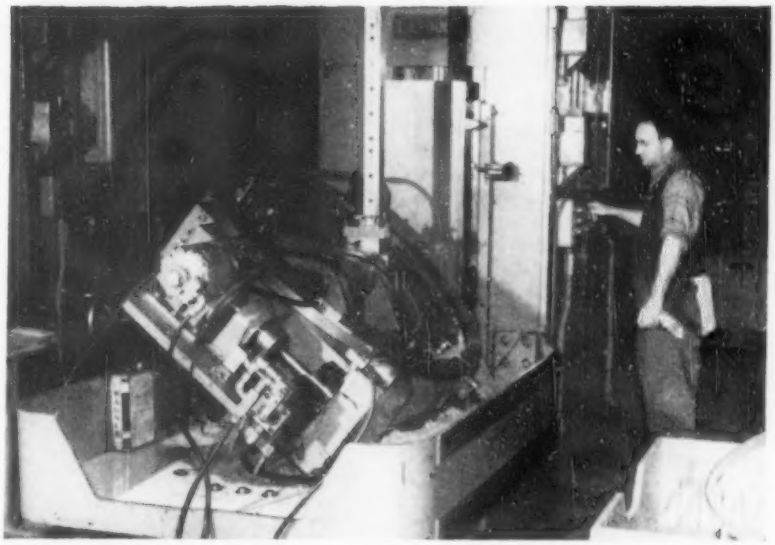
Another facility is the Crown-owned Nobel Test Laboratories about 70 mi. north of Malton, near Parry Sound. This is Avro's plant 3, operated by its engineering department and capable of full-scale engine testing.

▶ **Production Facility**—The engine production facility at Avro is one of the most modern anywhere. It covers 740,000 sq. ft. Originally Crown-owned, the plant was purchased by Avro. Machinery still is government-owned.

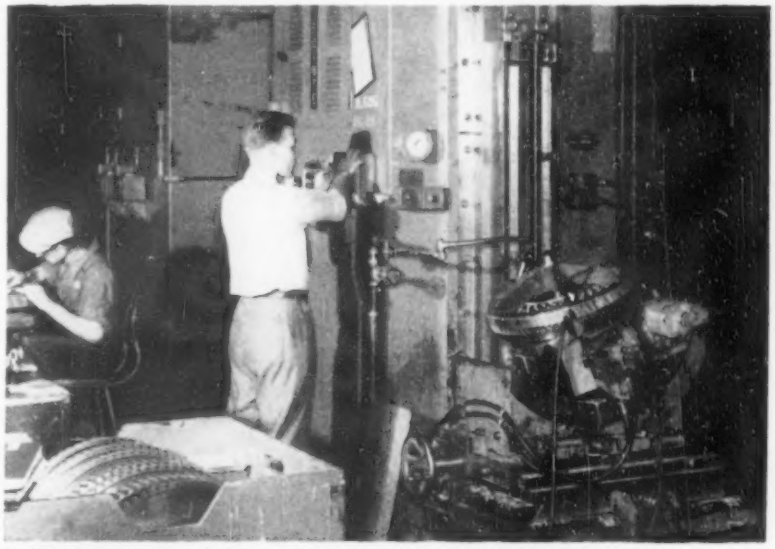
Within 16 months after its official opening Sept. 29, 1952, the facility had reached its production objective, a rate of 100 engines per month, well below peak capacity. Under its present program, this rate is to be continued until October 1955, when it should drop to 65 units per month. Current orders run out in the spring of 1956.

Purpose of establishing the Avro engine production facility was to set up in Canada an almost completely independent basic engine plant together with its sources of supply. The base of important suppliers brought into the Avro production plan include:

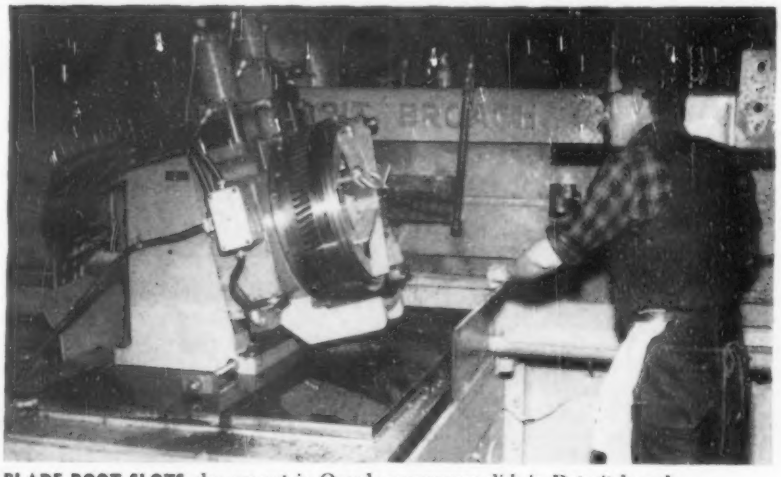
• **Frigidaire Products division** of General Motors, Canada, supplying machined blading and buckets to Avro. Initially, the jobs were processed, equipment purchased and tools manufactured by Avro, then transferred to Frigidaire



STATOR BLADE RING root slots are cut in LaPointe saddle broaching machine.



COMPRESSOR DISK in LaPointe vertical broach for cutting blade root slots.



BLADE ROOT SLOTS also are cut in Orenda compressor disk in Detroit broach.

for actual production, because Avro was short of space as a result of some job switching.

• **Canadian Steel Improvement Ltd.,** supplying rough, forged steel blades and buckets and finished-forged aluminum blades to Frigidaire for various machining jobs. The CSI facility, a 60,000-sq. ft. plant, was built specially for Orenda production. This past spring, CSI was purchased by the British Hawker Siddeley Group, of which Avro Canada is a member, adding substantially to HS's heavy stake in expanding Canadian industry.

Intention is to expand this CSI facility. It is slated to develop and supply Avro with titanium alloy forgings for future engines—initially, probably for Avro's new 18,000-20,000-lb-thrust jet scheduled to power the company's Mach 2 delta interceptor.

• **Lucas-Rotax Ltd.,** a division of Joseph Lucas Co. Ltd., England, initially set up to supply fuel system components for the Orenda engine, Avro reports.

• **Light Alloys Ltd.,** a division of Dominion Magnesium Ltd., supplying the intake casting, compressor casing, center casting, backbone, bearing housings and gearbox castings for the engine. Also supplying parts for the CF-100 program, this company does about 90% of its work for Avro.

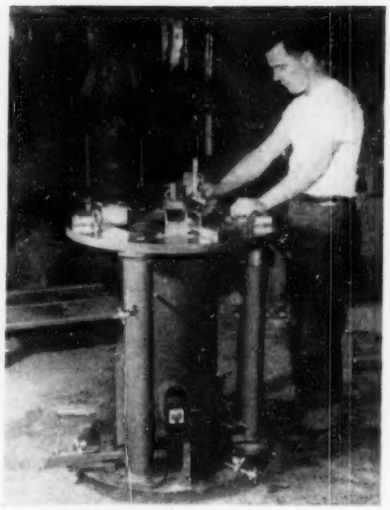
• **York Gears Ltd.,** a division of Canadian Acme Screw & Gear Co. York was established to produce all gearboxes for the Orenda engine.

• **MacDonald Bros. Aircraft Ltd.** About one-fifth of this company's production area is devoted to the manufacture of tailcone and tailpipes for Avro.

• **Cockshut Aircraft Ltd.** Converted to do various sheet metal jobs, this activity turns out combustion cans and flame tubes for the Orenda. A large percentage of those employed in this work were considered unskilled at the start of operations, Avro engineers say, adding that this condition initially was typical of other subcontractors and Avro itself.

► **Work Return**—Avro machines all the major castings and forgings, spacer rings, shafting, and hot-end details made from castings. Blade and bucket work at Frigidaire is scheduled to return to Avro this winter, as another step to lower the cost of the engine, Avro production men say. Improvement in the learning curve now permits this work to be brought back into the shop.

U. S. suppliers also furnish Avro with some of its equipment requirements. These companies include Bendix Aviation Corp.; Bendix's Scintilla Magneto division, Jack & Heintz, Inc.; W. H. Nichols Co.; AiResearch Mfg. Co.; Marlin-Rockwell Corp. and Weldon Tool Co.



BACKBONE CASTING for Orenda is inspected in special jig.

► **Engineering, Experimental** – Avro's engineering and experimental manufacturing department occupies about 273,000 sq. ft. in Plant 1. Some 80% of the equipment in the facility is owned by Avro.

The engineering section is staffed by about 230 engineers and technically trained personnel. Other personnel, including draftsmen and clerks, swell this figure to about 850.

Experimental manufacturing staff—also responsible to the engineering activity—has about 775 engaged in the various trades.

The overall engineering and experimental manufacturing department is responsible for:

• **Origination** of basic (research) data for design.

• **Initiation** of work on development contracts from the Department of Defense Production on behalf of the Royal Canadian Air Force. The activity also undertakes work required to support production of these developmental units.

• **Handles initial work** on changes dictated by service requirements, production difficulties or improvement in design. Example: The change from single to two-stage turbine in the Orenda. The design change was started in November 1952, the design was complete by the middle of February 1953, the first engine was available in May 1953. Model test was completed successfully in February 1954.

► **Study, Prototype Work** – Experimental manufacturing department has an investigation group which studies methods of manufacturing for a new design and carries this experience over to the production activity to see that it is implemented properly.

The department also does prototype manufacturing, as well, against production order numbers on quantities up to 25 sets of parts. This helps the production force while it readies its tooling, permits the experimental manufacturing department to retain its shop force. The department on occasions might take on some overflow work for the production activity.

► **Job Facilities**—Shops operated by the experimental manufacturing activity include a small foundry for aluminum sand castings in weights up to about 25 lb. finished; investment castings and small shell moldings for castings weighing up to 4-5 lb. Associated with the foundry operation is a pattern shop.

There is a fairly large machine shop equipped with typical machines.

A sheet metal shop produces a fair proportion of the combustion ware and other hot end parts on experimental designs.

► **Laboratories**—In addition, there are laboratories for fuel and control systems, mechanical components and instruments, and a small windtunnel.

At the Nobel Test Laboratories, Avro has about 160 people at work, is stressing combustion research. Relight guarantee for the Orenda was 30 sec. at 20,000 ft. Advent of JP-4 fuel brought the altitude down to 10,000 ft., but Avro researchers brought the figure back to 20,000 ft. through improvements in cross-lighting tubes and in other details.

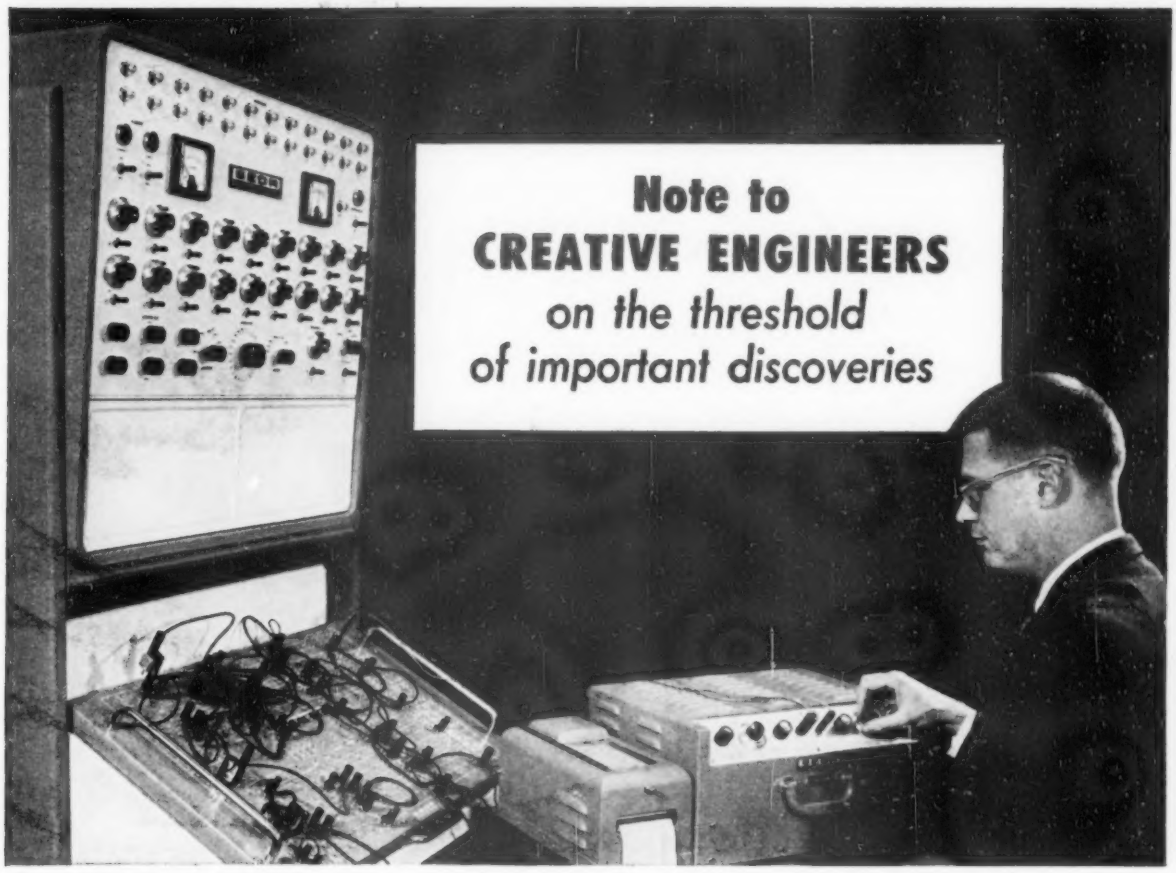
Further research at Nobel has given relight ability with the Orenda in 7 sec. above 50,000 ft., it is reported. Another Avro achievement is the design of an annular chamber within the diameter limits of the compressor inlet, for efficient combustion.

Quantity Output for Solid Rocket Charges

Solid-propellant rocket charges for the Nike and Honest John missiles and Rato units are now being produced in quantity by the Hercules Powder Co., Wilmington, Del.

An Army Ordnance Corps contract with Hercules has been increased by $100 million and extended for 15 to 18 months, covering the production of the charges for the three aircraft applications, plus other charges for rocket and cannon propellants. The work is being done at two Ordnance plants being operated by Hercules: Radford Arsenal, Radford, Va., and Sunflower Ordnance Works, Lawrence, Kan.

Hercules is making the solid-propellant charge in the Nike booster, the main charge for Honest John, and what the company calls an "... improved all-weather model of the Air Force" Rato unit.



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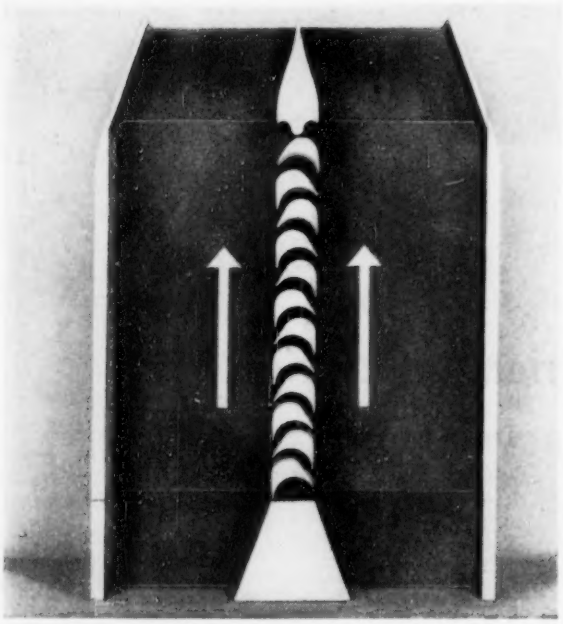
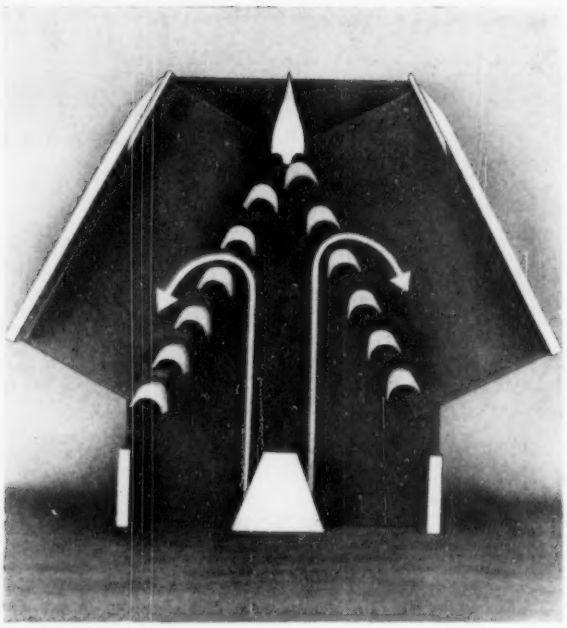
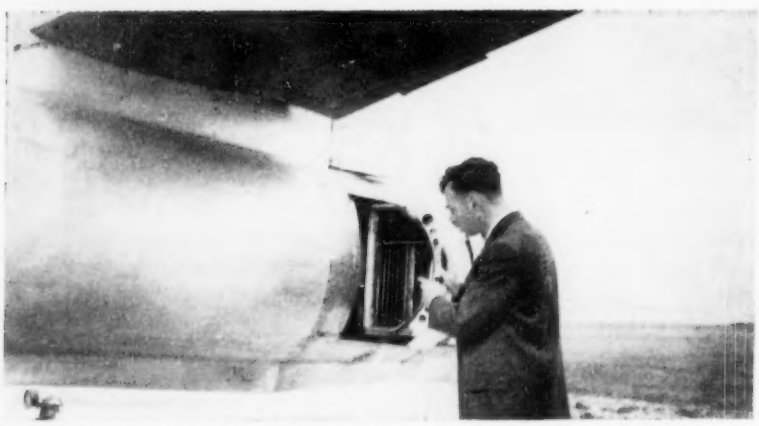


IN STORED POSITION, reverser costs about 2% thrust loss.

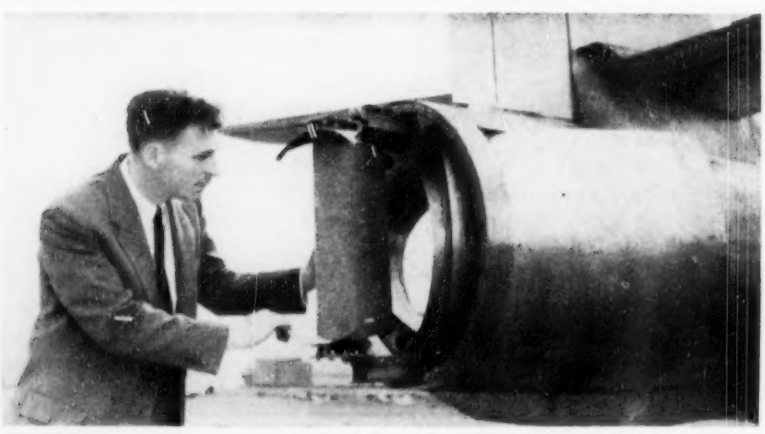


IN OPERATING POSITION, gases are deflected by blades.

NACA Unit Gives 50% Thrust Reverse



FORWARD VIEW of F-84 test installation shows vanes in thrust-reverse position.



REAR VIEW shows how tailpipe exit shape alters when thrust is being reversed.

Cleveland—Thrust reversal for shortening the landing roll of jet-powered aircraft is being studied intensively here at the National Advisory Committee for Aeronautics' Lewis Flight Propulsion Laboratory.

After a few months of ground-floor effort, NACA researchers have come up with a preliminary experimental model of a reverser, which was demonstrated at the organization's recent 1954 inspection at Lewis.

▶ **How It Works**—The reverser is a split cascade type offering about 50% thrust reversal—a relatively high value—for about a 2% loss of thrust when not in use.

For experimental purposes, it has been installed on an F-84 jet fighter and also is going on a jet pod installation under the wing of one of NACA's Fairchild C-82s used for research, it is reported.

The configuration involves a double set of nested Inconel blades stowed in the engine tailpipe. For thrust reversal, the tailpipe section splits into two cylindrical side portions, each bringing one set of blades into cascade squarely across the tailpipe flow, so turning the exhaust gas forward past the open tailpipe sides. In this way, no auxiliary device is required to make the flow engage the cascade.

▶ **Potential, Weight**—Although refinement of the configuration could offer perhaps even 10% more thrust reversal, chargeable against the design is the interior stowage with its consequent loss

FLY WEATHER-WISE

[These weather items prepared in consultation with the United States Weather Bureau]

In summer, sharp static on the radio is a good sign of thunderstorm activity within 100 miles. Look to the west or southwest for cloud build-ups for approaching storms.

Keep your altimeter set to the latest official settings, reported from stations along your route. Otherwise, it will indicate higher than true height when flying into lower pressures.

PHOTO COURTESY
ROLLSMAN INSTRUMENT CORPORATION

Early morning stratus clouds will generally dissipate by mid-morning if no other cloud layers are above.

In otherwise fine weather, it may be impossible to maintain VFR flight, because of haze. Get above the haze level at 4 to 8 thousand feet for best visibility. Figure on poorer visibility when headed into sun.

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of thrust. This inside stowage also would limit the reverser's application to non-afterburning engines.

Weight of the design is another consideration—at this stage of very preliminary development, the configuration introduces a weight figure of about 250 lb., it is reported. It must be noted that NACA's preliminary research efforts have not emphasized weight reduction. Undoubtedly, the weight could be pared.

▶**Compromise**—Like most other developments related to aeronautics, the ultimate solution to reverser problems will involve compromises. Thus, with respect to bombers where long range is important, a low thrust loss from stowage is a prime consideration.

A reasonable thrust reversal—about 10% on a dry runway, 20% on a wet runway might be sufficient.

On a transport, where safety is a key factor, high thrust reversal would be desired, obtained perhaps at the expense of some thrust loss in flight. Airline transports, of course, would be tagged to incorporate both high thrust reversal and very low thrust loss in flight —the ultimate aim of thrust reverser designers.

▶**Target Type**—NACA researchers also are working on a target type of reverser which promises relatively high thrust-reversal values. This type already has undergone considerable development. Various configurations have been revealed by Boeing Airplane Co. (Aviation Week Apr. 19, p. 28).

Tests of these configurations showed that about 45-50% reversal of the jet blast is possible with units that could reasonably fit into the space available near the engine tailpipe. One of the most promising—a clamshell unit—highlights features of mechanical simplicity, reasonable weight and simple external stowage (around tailpipe) so that there is no interference with exhaust flow during flight.

Estimates are that a target-type installation would not exceed 200 lb., with development and operating experience probably bringing this figure even lower.

▶**Annular Cascade**—Another type of thrust reverser employs a series of rings behind the engine tailpipe to form an annular cascade (Aviation Week June 14, p. 18). This configuration is a development of Snecma, France's nationalized aircraft engine factory. The design is available in three types—retractable, detachable and fixed.

To force the gas through the annular cascade, a jet of air is piped upstream through the middle of the exhaust stream. The greater the force of the air blast, the greater will be the amount of exhaust gas diverted into the cascade for increased thrust reversal. Because the blast remains in the jet stream while the reverser is not in use, the forward thrust of the engine is somewhat reduced.

With this annular cascade type, about 20% thrust reversal is available; thrust loss with the retractable type is about 2%, with the detachable and fixed types about 4%. Retractable unit imposes additional engine weight equivalent to about 5 to 6%; for the fixed and detachable units it is about 3 to 4% more.

▶**Swirl Vanes**—In another form of the cascade type, the exhaust gas is made to swirl by a set of vanes in the tailpipe. Increase in the angular setting of the vanes directs more of the gas through the cascade, increasing the reserve thrust.

Since the swirl vanes remain in the jet stream during normal operation of the engine, the thrust is reduced somewhat.

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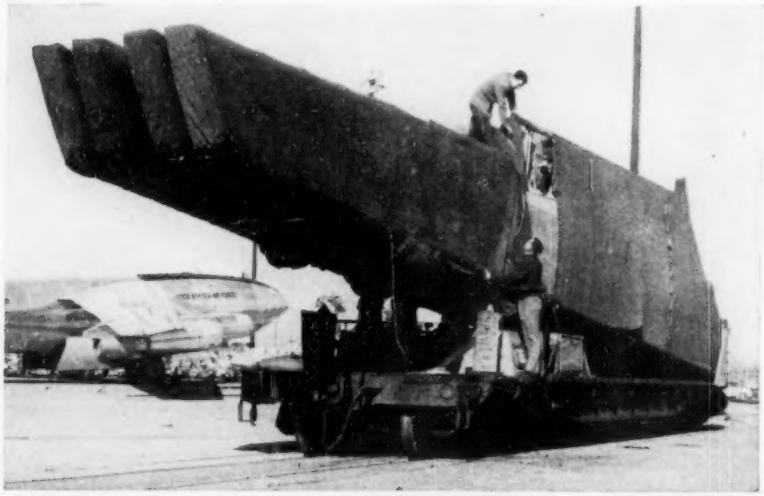

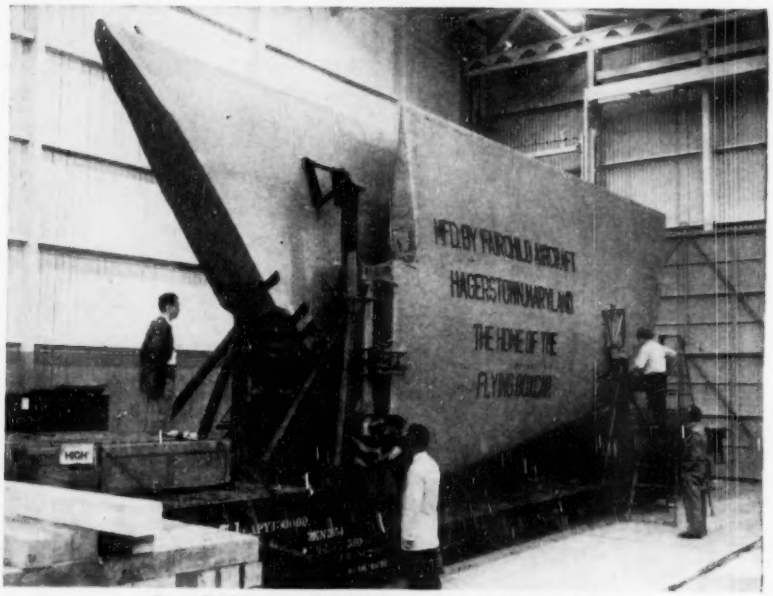

Jet Wings Roll Before They Fly

These B-47 wings (top) and the outboard wings and tail fins for the B-52 (lower) make long trips by rail before arriving at Boeing Airplane Co.'s Wichita and Seattle plants, respectively, from the bomber-builder's subcontractors. The B-52's wings and fins measure about 43 ft. long and 17½ ft. high, but weigh only about 12,000 lb., making the assemblies vulnerable to the wind. Thus special fixtures attached to the railroad car and to the assemblies are used to cushion shocks. The B-47's wings are seen covered with large Goodrich Chemical Co. Geon vinyl plastic fabric covers to protect the units from smoke, grease, soot and abrasion during their journey. Approximately 2,000 sq. ft. of fabric is needed to cover each 58-ft. long wing. Bulky shipments like these often require special planning and special routes to avoid low bridges.

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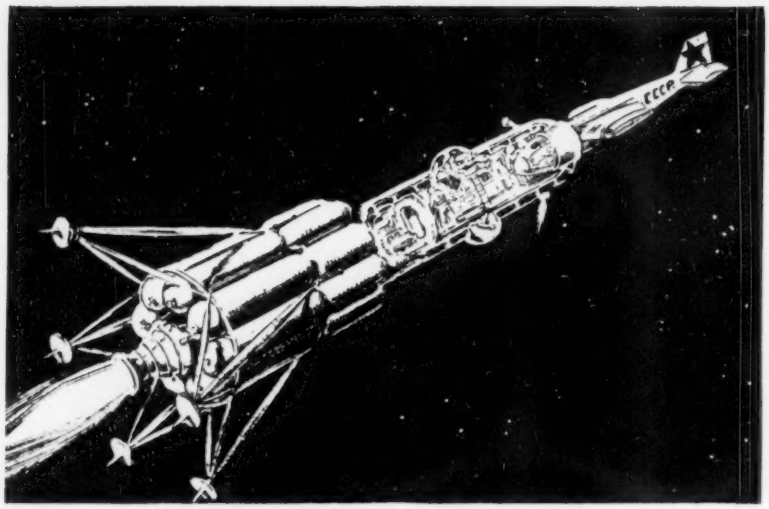


RUSSIAN CONCEPTION OF SPACE ROCKET

Trip to the Moon: A Russian View

What do Russian scientists think about the possibilities of space flight? How do Red engineers view the difficulties that will be encountered? Their ideas are not too different from those of American experts, judging from reports that have appeared in Red publications.

The following article, translated from the Russian for Aviation Week, is by Prof. Kirill Stanyukovich, Doctor of Technical Sciences. Mixed in with considerable political fingershaking at the West, the article contains interesting commentaries on interplanetary flight and its problems. It appeared in the Russian semi-monthly magazine, News, Issue 11, June 1954.

The New York Times has carried a report of a speech made by Mr. George Sutton, head of the aerophysics department of the North American Aviation Co. Mr. Sutton, the paper said, noted the Soviet Union's progress in the sphere of rocket engines and in exploring the possibility of creating an artificial satellite of the earth. The New York Times commented on the speech as follows: "The possibility that the Russians might be able to fire into the skies an artificial satellite of the earth that would appear as a 'red star' symbolic of Soviet superiority in the upper atmosphere was presented here today."

▶**'Irresponsible Commentary'**—Since I have not seen the full text of Mr. Sutton's speech I cannot, of course, voice any opinion of his actual words and intentions. But I cannot help taking objection to the New York Times' irresponsible commentary which is clearly intended to build up a false impression about the objectives pursued by the Soviet Union, and at the same time to scare its readers with its idle talk about a Soviet artificial satellite of the earth and other space experiments with the purpose of attacking the United States.

What makes this sensation-mongering sleight-of-hand by the New York Times all the more absurd is the fact that many American magazines regularly publish fantasies about the creation of such a satellite by the United States in order to gain world domination and attack the democratic countries of Europe and Asia. The New York Times counts on gullible readers. It is a case of the criminal shouting "stop thief."

A trip to the moon and other planets, and the creation of an artificial satellite of the earth are ideas that have long intrigued the minds of men. During the past decade, newspapers and magazines have been writing about this problem more widely than ever. Treatment of important aspects of interplanetary travel in non-scientific publications could only be welcomed were it not for the fact certain publications in the West go in for the sensational, or, what is worse, for political and military speculation, relegating scientific problems to the background.

In a number of articles ("Collier's" for one) fantasy goes hand in hand with a purely political and military interest in the problem of developing long-range rockets, for, their authors argue, rockets which can climb to a height of several hundred kilometers can cover tremendous distances and can be guided from any point of the globe to any other point. A rocket of that kind, the authors say, should have an A-bomb or H-bomb filling.

▶**Complicated Task**—Let us examine this question of rockets and a trip to the moon to see just what is scientific and possible and what is superficial fantastic blather.

Although the basic features of an interplanetary rocket and the theory of its flight were formulated and worked out long ago by Konstantin Tsiolkovsky, the eminent Russian scientist, and by scientists of other countries, a trip into space has not yet been made. The explanation lies in the tremendous difficulties encountered even in building rockets intended for more modest purposes, such as taking soundings in the upper air.

To design an engine that will function for a long time at stable combustion regimens is an extremely complicated task. This partly explains why we do not yet have an interplanetary rocket, although its principles are sufficiently well known. Konstantin Tsiolkovsky and Robert Goddard, the American physicist, were fully aware of these circumstances and each designed, independently, a composite rocket which, in his opinion, would solve the task of flight into space.

▶**Composite Rocket**—The composite rocket consists of a number of separate rockets. After the fuel of each is exhausted it drops off from the unused rockets. By that time the one or two remaining rockets have acquired speed in the neighborhood of 10 to 15 kilometers per second, in relation to the earth, the speed necessary for interplanetary travel.

The engine of each of the rockets does not have to work a long time, and problems relating to its operation and cooling can be solved (and have already been solved in practice) much more simply than the problems raised by a single engine of a single large rocket.

Scientists and engineers are perfecting the design of such rockets, surmounting the numerous difficulties step by step. Apparently, after long rocket trips into the upper air it will be possible to get down directly to a building a rocket for a two-way trip to the vicinity of the moon, and only then a rocket for a flight to the moon with a landing there and a subsequent return to earth.

Fuel would also have to be expended in slowing down the rocket for the landing on the moon and later for the takeoff, but that expenditure would be only 10 or 15% of the amount needed to overcome the earth's gravity.

▶**Coming Back**—Many people are interested in the question of the return from cosmic space to earth. The usual conjecture is that when the rocket entered the earth's atmosphere, wings would be spread out and it would be turned into an airplane or glider. Air

resistance would quickly lower speed, and the craft would be able to land without any difficulty.

Hazards during interplanetary flights of long duration would be meteorites and cosmic dust. Every 24 hours, according to present-day data, not less than five tons of meteorites enter the earth's atmosphere. The possibility of a space rocket meeting a meteorite has been calculated as once in 5,000-10,000 hours of flight. Yet even a meteorite weighing one gram is a menace, since it could tear as much as a whole kilogram of steel out of the shell of the craft or pierce a shell scores of centimeters thick.

▶**Unmanned Vehicle First**—What seems most likely to me is that the first stage will be the sending of a rocket containing instruments to record the physical conditions in space and take a sample of "moon ground."

Flight by men into interplanetary space is theoretically possible too, but it creates additional difficulties. For one thing, it is not known how the human body will withstand the absence of gravitational force while the rocket is flying by inertia. Evidently this will cause a sharp change in blood circulation. With the present-day achievements in the sphere of automatic control and radiolocation, the guiding of a pilotless rocket is fully feasible.

In 1895, Tsiolkovsky thought and wrote about the possibility of creating an artificial satellite of the earth, moving in an orbit beyond the atmosphere and serving as a scientific and technical station for interplanetary rockets.

There can be no doubt that, if sponsored by peace-loving nations, an artificial satellite of the earth, as well as interplanetary travel in general, could and should serve mankind's further progress and prosperity, and the broadening of human knowledge.

It should be noted, however, that Collier's and certain other American publications are inclined to view a solution of these problems only in terms of U. S. military potentialities, as a new weapon for forcing a system of political dictation upon the peoples of the world.

▶**Should be Used for Peace**—During World War II we all saw the frightful consequences of rocket weapons used against the civilian population of Britain. It is the duty of every scientist working in the field of rocket techniques to prevent the achievements of human genius from every being used for such purposes again.

I am deeply convinced that fantasy can be a powerful stimulus to the progress of scientific thought. The history of the science of interplanetary travel convincingly illustrates that.

However, some of the articles of military-political fantasy in the field

(Advertisement)

Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,
Senior Member, Aviation Writers Assn.

If you should study the records on 275,000 fuel and oil valves in military use over a period of 18 months, what failure rate would you expect?

Two or three percent would be a good showing, you say?

I agree — for ordinary valves.

But in the case of Whittaker valves, you can cut the percentage to .3 percent. That's right. Three-tenths of one percent.

This is no guess, no estimate. Rather, it's the result of a careful Air Force analysis that was undertaken when the valve company proposed to take the rubber seals out of all its fuel and oil units in service use and replace them with Teflon.

At the USAF's Oklahoma City Air Materiel Area, all unsatisfactory reports written against Whittaker fuel and oil valves – at all bases throughout the world – from September 1952 to March 1954 – were carefully studied.

The answer: Three-tenths of one percent failure rate, a surprise, even to the Air Force.

Even by the rule of thumb which assumes five unscheduled removals for every UR submitted (an estimate on the high side) the figures still yield a failure rate of but 1.5 percent, a remarkable record, especially when you consider the USAF's varied operations in virtually every section of the globe.

Needless to say, the proposed program of changing seals was quickly shelved by the Air Force in face of the company's outstanding showing.

If you talk to Tom Loughan, Whittaker's Chief Service Engineer, and leaf through his reports, you'll learn some intriguing details about valves and maintenance.

One plant's field service summary, for instance, reported special trouble recently, with 23 cases of actuators burning out on fuel shut-off valves, 22 instances of periphery seal leakage, and six of corrosion.

An intensive study was undertaken at once – including visits to 15 air bases where the plant's airplanes are in operation – for all manufacturers look for trouble trends, and this could well have been one.

The investigation showed: That 90 percent of the burned-out motors were caused by improper use of an electronic ground test unit; that the periphery leakage was caused by aluminum filings carried along the fuel lines from the tip tanks; that the corrosion stemmed from the practice of washing down the aircraft with a special compound without taping or sealing off valves exposed by open landing gear doors.

I mention this study merely to point out that unsatisfactory reports, or UR's as they are called, do not necessarily mean trouble with the valve itself. Many times there are contributing factors. Nevertheless, the UR is invaluable in the joint Air Force-manufacturer program of preventive analysis – constant studies to spot trends and cure ills before they become chronic.

Whittaker representatives, for example, make regular visits to Norton AFB, San Bernardino, California, headquarters of the Inspector General's Office, where complete records are kept on all UR's written.

If the reports show trouble at an individual base, it's 10-to-1 a local problem, caused, perhaps, by peculiar climatic conditions or by peculiarities in maintenance and test procedures. But if similar failures pop up simultaneously at different bases, the trend is well-established and it acts like an air raid alarm.

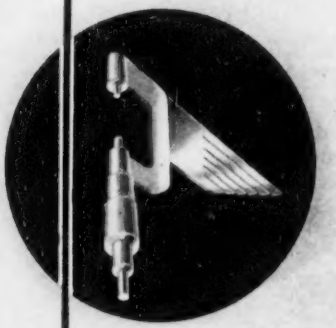
Field analysis is immediate and thorough and, if the trouble can conceivably affect flight safety, it must be corrected at once, even to grounding the aircraft, if necessary. On the other hand, if flight safety is not involved, the correction can be assigned under a time compliance tech order to be completed at the next overhaul.

Service representatives also become readers of human nature, if you will, and they learn the problems of military ground crews. The first time a service rep checks base inventory against UR's, he's likely to be perplexed indeed.

But when he finds that a crew chief has "stocked" as many as a half-dozen units for one UR, he quickly learns about the old Army game called the "midnight requisition."

Nor can you blame a crew chief for being damned sure his airplane has everything it needs now—or may need a long time from now!

Hecker



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of astronautics and rocket techniques carried by Collier's, the New York Times and other American publications can only harm science, and to no little degree, by compromising its peaceful aims in the eyes of scores of millions of people who sincerely believe that space travel will give man new knowledge, forces and potentialities for his constructive labors on earth.

I think there is no doubt that if the scientists of different countries cooperate with one another, regardless of political views, if they really work together to solve the remaining problems of interplanetary travel for peaceful purposes, as is declared in the Charter of the International Astronautics Federation, then we shall be able within the next five or 10 years to talk in practical terms about sending a guided missile to the moon for the benefit of international science.

New Aluminum Alloy Designations Set

A new wrought aluminum alloy designation system has been developed and approved by The Aluminum Assn. The change is effective Oct. 1.

The system will use four-digit numbers. Thus, aluminum alloys grouped by major alloying elements are:

- **Copper** 2xxx
- **Manganese** 3xxx
- **Silicon** 4xxx
- **Magnesium** 5xxx
- **Magnesium and silicon** 6xxx
- **Zinc** 7xxx
- **Other element** 8xxx
- **Unused series (present)** 9xxx

In all these groups, the last two digits have no special significance except to identify the different alloys in the group. Generally, they are the same as those formerly used to designate the alloy. Thus, 24S becomes 2024. For new alloys, the last two digits will be assigned consecutively beginning with xx01.

Second digit in the 2xxx-8xxx series indicates a modification of the alloy and replaces the letters commonly used for this purpose in the past. Thus, 17S becomes 2017; A17S becomes 2117.

Temper designations in effect since 1947 are being continued without change and, as in the past, will follow the alloy designations.

Experimental alloys will continue to carry a prefix X, which will be dropped when the alloy becomes standard.

The 1xxx series, designating minimum aluminum purities of 99.00% and higher, differs basically from the other series. Last two digits indicate the decimal portion above the minimum 99%. Second digit designates any modifications in the impurity limits. Thus, 1030 indicates 99.30% minimum aluminum without special control of individual impurities; 1130, 1230, etc., indicate the same purity, with special control of one or more impurities.

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Special assistant to the Secretary of the Air Force Trevor Gardner (left) stands by a high Mach number variable nozzle for ramjet tests in the Engine Test Facility at USAF's Arnold Engineering Development Center during a recent inspection of the installation. Engine Test is the first of the major laboratories to begin operations at the Tullahoma, Tenn., facility. With Gardner are Brig. Gen. S. R. Arris, AEDC commander (right), and Gaylord W. Newton, chief of the Engine Test Facility.

OVERSEAS SPOTLIGHT

Friendship Costs More

LONDON

Estimated price of Fokker F.27 Friendship transport has gone up to $462,000 from previous quotation of $395,000, according to the British magazine, Flight. The rise is said to be due to higher labor costs and accessory prices. Usable wing fuel capacity has been raised to a little more than 1,020 gal., a 140-gal. increase.

Two Friendship prototypes are under construction at Fokker's Amsterdam works.

Avianca Tries R2000s

BOGOTA

Avianca, Colombia's largest airline, is making a test installation of R2000 engines on two of its DC-3s. If the flights check out as expected, Avianca plans to convert its entire fleet of more than two dozen DC-3s, as well as its C-46s. Cost of the conversion is estimated by Avianca at about $85,000 a plane, including changes such as built-in ladders in the doors.

The more powerful engines will permit Avianca to lift greater payloads off the 8,700-ft.-high airport in Bogota, and raise the DC-3's ceiling and cruising speed, company officials say.

Avons Pile up Hours

LONDON

An English Electric RAF Canberra has covered 156,000 mi.–more than half the distance to the moon–in a 300-hr., seven-day-a-week endurance trial designed to test its Rolls-Royce Avon engines.

After 300 hr., RAF's report on the engines was: "No troubles encountered and no replacements required," so the test was extended for another 100 hr.

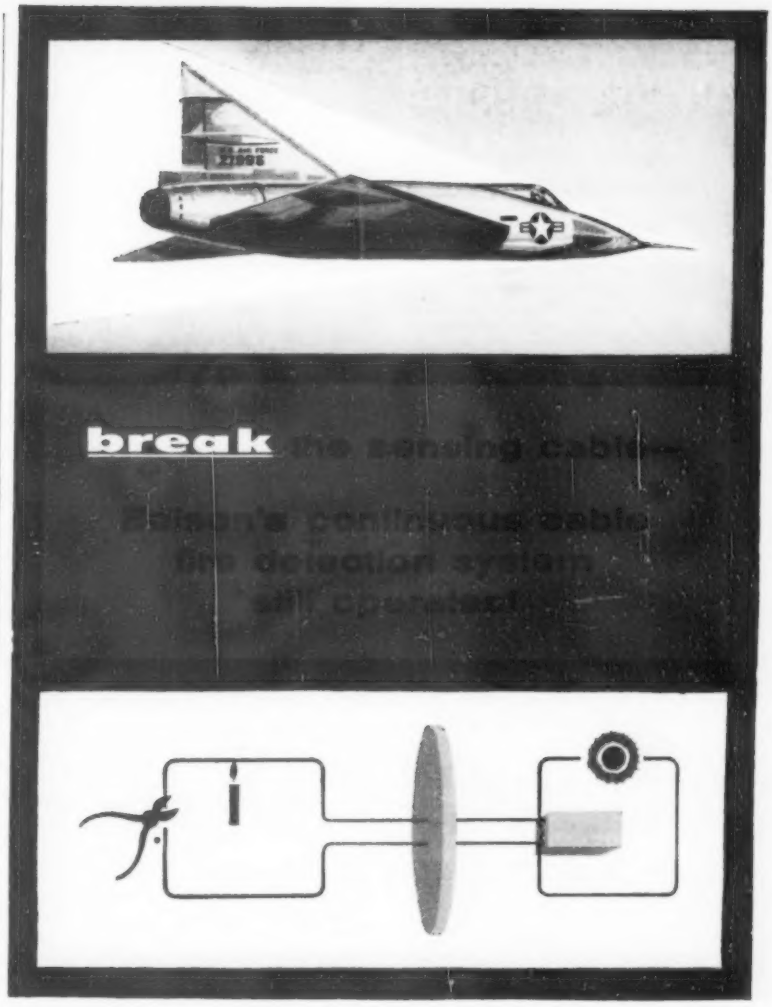
The plane, a P.R.7, photo-recon version of the Canberra, was flown to altitudes above 40,000 ft. and in all kinds of weather.

Canadian Copter Meeting

OTTAWA

Commercial copter operators and government representatives met here recently to discuss modification of existing regulations that have hampered helicopter development, the Canadian Air Industries and Transport Assn. reports. Regulations originally were written with fixed-wing aircraft in mind and take no account of the helicopter's unique flying characteristics.

The board of directors of AITA has recommended several changes in regulations and is making an official approach to the Department of Transport.



Exclusively Edison – because this newest advance in aircraft fire detection is a single wire centered in thermistor material–with the outer sheath acting as a ground. Fire detection is guaranteed even with a break.

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▸ **Uses direct current** – operates from primary battery supply – eliminates electronic tubes.

▸ **Exclusive snap clamps** – permit simple installation–speed maintenance.

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▸ **Varying temperature alarm points** – from a single detector circuit in one continuous cable –guarantee maximum sensitivity for each area guarded.

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For special jobs requiring a flush fitting structural fastener, a Simmonds Cowling Latch may be the answer. Successfully installed on a growing number of U.S. aircraft, Simmonds structural latches fit flush with cowling or other curved surfaces, (56 in. to flat). Simple in operation, positive in action. 6 to 8 oz. weight, will withstand 7500 lbs. tension. Priced at a saving over comparable latches. Write for portfolio giving design details and full scale drawings.

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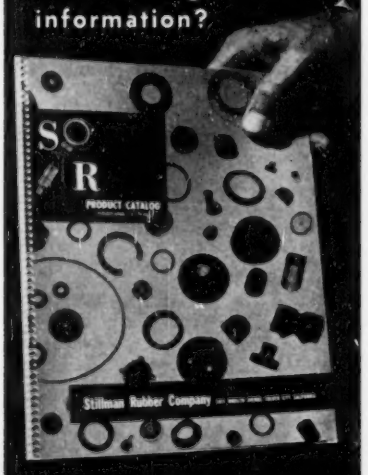

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PRODUCTION BRIEFING

▶ **Canadair, Ltd.,** Montreal is building a new engineering and test and laboratory equipment structure having some 12,000 sq. ft. of floor area.

▶ **Piper Aircraft Corp.,** Lock Haven, Pa., has passed the 50 mark on twin-engine Apache executive transports going onto the final assembly line. More than one dozen have been delivered and approximately that number is in pre-delivery flight stage.

▶ **B. F. Goodrich Co.** has opened its largest distribution center, covering 200,000 sq. ft. of floor space, at 3770 Indianapolis Ave., Columbus, Ohio. This also houses the firm's Tire & Equipment and Industrial Products Divisions district offices.

▶ **Lear International, Inc.,** has been formed, absorbing Lear International Export Corp., as exclusive export agent for all of the company's products, with the exception of certain products in Canada. The new firm, with headquarters at 345 Madison Ave., New York, is headed by Harvey H. Dwight as board chairman. Other offices will be in Washington, D. C., and Paris, France.

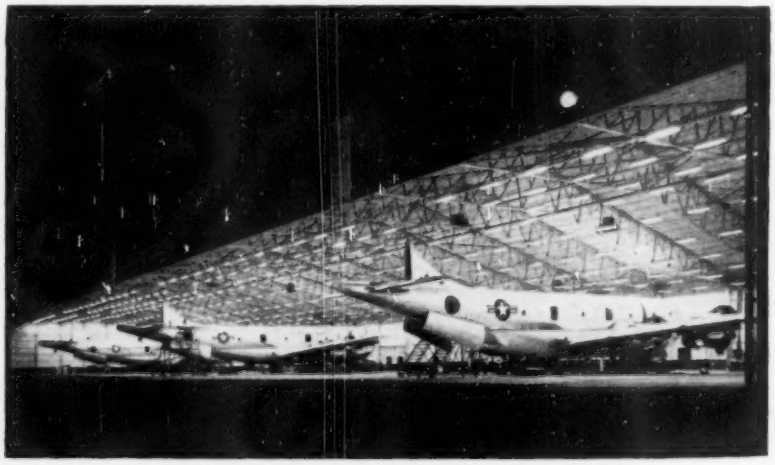
▶ **Carl W. Schutter Engineering Corp.** has acquired Fernandina Beach (Fla.) Municipal Airport, formerly a Naval air station, which the firm will develop into a center to work on communications and electronic gear, servicing of military and civil aircraft, communications and marine equipment. Schutter emphasizes that this new activity is a separate entity and is not connected with company's current radar activities in New York.

▶ **Aero Engineering Co.,** Mineola, N. Y., and Air Cruisers Co., Belmar, N. J., recently acquired by Garrett Corp. of Los Angeles, have been made divisions of Garrett. A new Canadian subsidiary, formerly Aero Sales Engineering, Ottawa, has been renamed Garrett Manufacturing Corp. of Canada, Ltd.

▶ **Fouga & Co.,** Paris, France, is building a 426x98-ft. hangar at Toulouse-Blagnac to handle all flight test services. The hangar will be used for flight testing production Fouga 170R Magister jet trainers for the French Air Force.

▶ **Pacific Airmotive Corp.** has opened a Denver branch, with headquarters at Stapleton Field. Heading the new facility is James Staker, transferred from the firm's Kansas City branch.

▶ **Transocean Air Lines,** under an Air Materiel Command contract, will service all Military Air Transport Service planes touching Wake Island. Previously Transocean handled the servicing of only half of the military C-54 transports at Wake.



Temco Gets More Elbow Room

Night view of Temco Aircraft Corp.'s new 435x161-ft. open-face modification and overhaul hangar at Greenville, Tex., shows how three big Boeing C-97 Stratofreighter transports can be worked on under cover simultaneously. The cantilever-type overhanging roof provides a maximum of unobstructed space. Notches in the face of the roof give 45-ft. vertical clearance. Average clearance is 30 ft. The roof is hung on suspension trusses anchored to two rows of vertical columns, one row of which partitions the building into hangar and shop areas. Design and construction of the building was carried out by Irwin Newman Construction Co., Houston, Tex., which has also developed variations of the new Temco hangar.

USAF Contracts

Following is a list of recent USAF contracts announced by Air Materiel Command.

Adache & Case, Engineers, Suite 880, The Arcade, 41 Euclid Ave., Cleveland 14, Ohio, architect-engineer services, $68,114.

American Airlines, Inc., 100 Park Ave., New York 21, N. Y., storage of group B parts, CRAF program, $261,886.

Beech Aircraft Corp., Wichita, Kan., trainer airplanes, spare parts and data, $2,307,076.

Bendix Products Div., Bendix Aviation Corp., South Bend 20, Ind., brake assys., 626 ea., $474,891.

Boeing Airplane Co., Seattle, Wash., repair damaged B-47A & -E acfts., $86,323.

Capital Airlines, Inc., National Airport, Washington 1, D.C., CRAF program mod. of acft. and misc. chgs., $47,964.

Curtiss-Wright Corp., Propeller Div., Caldwell, N. J., special tools, $400,000.

Curtiss-Wright Corp., Wright-Aeronautical Div., Wood-Ridge, N. J., installation of machinery and equipment, $187,000; mod. of YJ65-W-1 eng., 83 ea., $747,090.

Diebold, Inc., Box 127, Norwalk, Conn., reader, 16- and 35-mm., 226 ea., $152,550.

Eclipse Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., air-speed indicator, 353 ea., $55,941; transmitter, 55 ea., indicator, 1,317 ea., $79,486; control, rate gyro, $69,946.

Emerson Radio & Phono Corp., 111 Eighth Ave., New York 11, N. Y., RT 122B/APW-11A airborne radar equip., 669 ea., $264,684.

Fairchild Camera and Instrument Corp., Robbins Lane, Syosset, L. I., N. Y., camera body, 675 ea., $2,875,425.

Ford Motor Co., 300 Schaiffer Rd., Dearborn, Mich., machinery and equipment for prod of J57 engs., $2,104,451.

Ford Motor Co., Chicago, Ill., install mach. and equip., $475,914.

Goodyear Tire & Rubber Co., 1144 E. Market St., Akron 16, Ohio, wheel assy., 190 ea., brake assy., 320 ea., $335,583.

Harvey Machine Co., Inc., Torrance, Calif., facilities, $370,000.

Hickok Electrical Instrument Co., 10514 Dupont Ave., Cleveland 8, Ohio, temp. indicator, 126 ea., $54,540.

Hoffman Laboratories Inc., 3761 South Hill St., Los Angeles 7, Calif., training parts tools and equipment, $25,000.

Kollsman Instrument Corp., 80-08 45th Ave., Elmhurst, N. Y., transmitter, pressure, 165 ea., $36,308.

Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

Atlas Paint & Varnish Co., 32-50 Buffington Ave., Irvington 11, N. J., paint, 14,500 gal., $26,100.

Dalmo Victor Co., 1414 El Camino Real, San Carlos, Calif., maintenance parts for radar equipment, $35,715.

B. F. Goodrich Co., 1112 Nineteenth St., N.W., Washington 6, D. C., tires and tubes, $29,009.

Grumman Aircraft Eng. Corp., Bethpage, L. I., N. Y., antennas, $78,986.

Lord Mfg. Co., 1635 W. 12th St., Erie 6, Pa., maintenance parts for mounts, $34,388.

Lowe Brothers Co., 424 E. Third St., Dayton 2, Ohio, enamel and lacquer, $48,537.

Malabar Mfg. Co., 950 Doolittle Drive, San Leandro, Calif., jacks and maintenance parts, $29,862.

McDonnell Aircraft Corp., St. Louis 3, Mo., ground handling equipment, $67,844.

Model Engineering and Mfg. Inc., 50 Fredericks St., Huntington, Ind., pulse generator, 143 ea., $377,124.

Pacific Paint and Varnish Co., 4th and Cedar Sts., Berkeley 10, Calif., enamel, 12,200 gal., $26,817.

Texas Instruments Inc., 6000 Lemmon Ave., Dallas 9, Tex., sub-assys. for AN/ASQ8 equipments, 245 ea., $34,790.

Thompson Products Inc., 23555 Euclid Ave., Cleveland 17, Ohio, fuel pump assys., $1,480,958.

Westinghouse Electric Corp., 3001 Walnut St., Philadelphia 4, Pa., dummy load, 147 ea., $27,751; computer test set, 64 ea., $236,006.

Zac-Lac Paint & Lacquer Corp., 350 Simpson St., N.W., Atlanta, Ga., lacquer, 14,944 gal., $28,556.

A. C. Spark Plug Div., General Motors Corp., Flint 2, Mich., spark plugs, 55,816 ea., $74,793.

Airborne Accessories Corp., 1414 Chestnut Ave., Hillside 5, N. J., maintenance parts for various aircraft, $58,026.

Aircraft Radio Corp., Boonton, N. J., radio test set, $237,041.

AiResearch Mfg. Co., 9851-9951 Sepulveda Blvd., Los Angeles 45, Calif., handbooks and revision pages, 1 ea., $44,773.

Ampruf Paint Co., Inc., 10925 Schmidt Rd., P. O. Box 508, El Monte, Calif., exterior paint interior enamel, $60,248.

Atlas Paint & Varnish Co., 32-50 Buffington Ave., Irvington 11, N. J., synthetic enamel, 18,585 gal., $39,173.

Allen D. Cardwell Electronics Production Corp., Plainville, Conn., parts for AN-GMDIA equipment, $46,980.

WHAT'S NEW

Telling the Market

How to Choose the Right Press defines many non-standard press terms in an effort to present the subject in easy-to-understand language. Profusely illustrated. Available from Interstate Machinery Co., 1465 W. Pershing Rd., Chicago 9, Ill. . . . **Miniature rigid push-pull controls** are covered in Bulletin 32, including tech data and specs. Write Arens Controls, Inc., 2017 Greenleaf St,. Evanston, Ill.

Thin-section bearings with ¼-in. cross sections and ¼-in. width up to 40-in. inside diameter and up to 1-in. cross sections up to 40-in. inside diameter are described in Engineering Catalog 54 available from Kaydon Engineering Corp., Muskegon, Mich. . . . Flexflyte lightweight **reinforced fabric ducting** for air handling, fume removal, dust collection and materials handling is covered in illustrated data sheets that can be obtained from Flexible Tubing Corp., Guilford, Conn. Material is used in aviation and electronics work.

Reference folder on **aircraft cable performance,** describing manufacturing process and data on strengths for various types, can be obtained from Aircraft Division of Bergen Wire Rope Co. Lodi, N. J. . . . **Valves for aircraft, guided missiles** and other industrial applications are described in 52-page catalog available from Russ Hamill, Marotta Valve Corp., Boonton, N. J.

Publication Received

• **Transocean, the Story of an Unusual Airline,** by Richard Thruelsen, Pub. by Henry Holt & Co., New York, $3.00, 241 pp. All about Orvis Nelson and Talou

• **Wind Tunnel Testing,** Second Edition, by Alan Pope, M. S., Pub. by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.; $8.50; 511 pp. Scope of the book embraces number of techniques not available at the time the first edition was prepared. Earlier data has been revised where necessary.

• **Aircraft Year Book—1953.** The Aircraft Industries Association of America, Inc.—Pub. by Lincoln Press, Inc., 511 11th St., N.W., Washington 4, D. C.; $6.00; 463 pp. Review of the industry's activities and accomplishments in 1953.

• **Business and Economic Statistics**—by William A. Spurr, Ph.D., Lester S. Kellogg, M.A., John H. Smith, Ph.D.—Pub. by Richard D. Irwin, Inc., Homewood, Ill.; $8.00; 579 pp. Book is designed for basic courses in statistics.

Grumman Opens New Assembly Plant

First view of Grumman Aircraft Engineering Corp.'s new Peconic River, N. Y., plant, where the company assembles Navy Cougar jet fighters. Grumman builds components at its Bethpage, N. Y., plant, then trucks them to the new factory, where they are put together and the planes flown away. Heavy population buildup around the Bethpage factory was a major factor in setting up this production system. Grumman currently employs about 600 persons here, expects to build up to 1,200.

After 10 Years New Targets Set for Instrument Progress as . . .

Jets Demand Lower Landing Minimums

• Missed approaches and 'go-rounds' could spell ruin to commercial jetliner operators.

By George B. Litchford and Joseph Lyman

A decade ago we could land an aircraft under most of the visibility conditions accompanying a 500-ft. ceiling. Today, after tremendous effort on the aircraft instrument landing problem, we can land an aircraft with a 200-ft. ceiling. Will it take another decade, or longer, to go the rest of the way?

Present-day reciprocating-engine airliners are getting by with the 200-ft. landing minimum, at least from an economic standpoint. But the Comet, the Boeing 707 and other jetliners are almost in service with us. Can they be operated efficiently with a 200-ft. minimum?

The fuel reserve of a piston aircraft enables it to take a missed approach "go-round" in its stride, but the jet airliner is economically committed to land once it is below 10,000 ft. The instrument approach and landing is conducted at low altitudes where fuel consumption for the jet aircraft is high. A missed low-visibility instrument approach caused by any one of several factors, requires enormous fuel reserves for a second approach, at the expense of payload.

The probability of a missed approach with a jet transport is higher and consequently the need to guarantee a landing is going to become a firm requirement.

▶ **For Example**—A few figures will illustrate this point: Assume a low-ceiling (200-300 ft.) condition with the accompanying instrument conditions, and approaches averaging 3 minutes apart. Assume also sufficient traffic to necessitate rescheduling a missed-approach aircraft in the traffic pattern, requiring 15 minutes to place it in the same approach position again.

The fuel consumed by a Comet 1 in such a missed-approach operation is about 2,100 lb. (AVIATION WEEK Mar. 18, 1952, p. 35), five times the 420 lb. required by a DC-6. The comparison between the jet and the piston aircraft will be even more unfavorable in the future when larger jets like the Boeing 707 and the Comet 3 become available.

LANDING CEILING has come down to 200 ft., still not good enough for jets.

▶ **Implication Recognized** — Realizing the implications of this impending situation, the Air Navigation Development Board has devoted much of its limited budget to basic research necessary to provide means to guarantee a safe landing at a pre-selected destination. The Navy and the Air Force also have championed the objective of all-weather landings for aircraft, even at zero ceiling.

It has taken nearly a decade to recognize fully the difficulty of the landing problem; many solutions have been tried and found wanting. However, the scope of the problem has become clear and we now realize that 10 years ago we were underestimating the difficulty of the solution by at least one order of magnitude. The jet transport, particularly the U. S. entries, will focus attention on this problem. In order to avert the disturbance that will arise when the jet transport becomes operational, a realistic review of current status and future trends is necessary.

▶ **The Problem**—Understanding the landing problem is itself a major product of the last decade of effort. Here is what we learned:

• **More than a radio system.** To land an aircraft requires not just a radio system but the amalgamation of many factors, including pilot psychology, traffic control, aerodynamics, and visual aids.

• **Coupling method important.** The method of coupling the aircraft to the landing system is very important. If it is automatic, time lag is removed; however, other problems appear, such as reliability, human monitoring, and lack of beam straightness. If the coupling is semi-automatic (computer to human pilot), we retain the human judgment and override, but lengthen the time lag in the coupling loop. We also encounter such problems as sensing reversals, errors in the computer setting, and shortcomings due to human nature.

• **Visual aids needed.** Although radio may eventually guide the aircraft all the way down to a landing, the pilot will, nevertheless, continually seek visual references. Visual aids can greatly assist the pilot during the few seconds

About the Authors

This article is based on a paper, "A Critical Look at the Last Decade of Instrument Landing Progress," by Joseph Lyman and George Litchford. Lyman and Litchford bring more than 30 years of collective experience to their "critical look."

After 15 and 10 years respectively with Sperry Gyroscope Co., where they had been engaged in research and development on instrument landing, air navigation, and traffic control problems, Lyman and Litchford joined Airborne Instruments Lab in 1951 to head its navigation section. Each holds 10 patents in the field and has more than half a dozen others pending. Both were members of the Future Plans Committee of the Provisional Civil Aviation Organization, predecessor to ICAO.

Litchford served on the Research & Development Board's subpanels on short-distance navigation and air traffic control. Lyman, who recently left AIL to form his own business, is a Naval flyer and holds the rank of lieutenant colonel in the Marine Corps Reserve.

prior to touchdown by providing much-needed reassurance.

• **Landing can be bottleneck.** To advance from the ability to land one aircraft under instrument conditions to the capability of landing a continual stream of aircraft presents the problem of aircraft separation and traffic control during the terminal feed-in, approach, landing, and taxiing phases. The purpose of any air traffic control system is to move the traffic to its destination expeditiously and safely. The landing phase is the single-track output element of the entire system; it must be efficient, safe, and used to its maximum capacity if the rest of the air traffic control system is to work at all.

• **Problem grows.** While attempting to build a landing system for aircraft like the DC-3, such heralds of the jet age as the Comet, the B-47, and the 707, have crept up on us. The attempted solutions, inadequate even for the DC-3, are even more inadequate for jet aircraft. The "committal to land" at some point near the end of an approach is a far more significant concept for jet aircraft than it was with the DC-3. Thus, the landing problem we have set out to solve has not remained static, but continuously increases in magnitude. Even before a solution has been attained, the problem has become more complex.

• **More data needed.** We have learned that we are uncertain about measuring ceiling and visibility. We are not even certain as to the exact path in space the aircraft follows. Briefly, we must measure the environment of an aircraft and crew under landing conditions more exactly before we can be certain of some of the weaknesses in the operation.

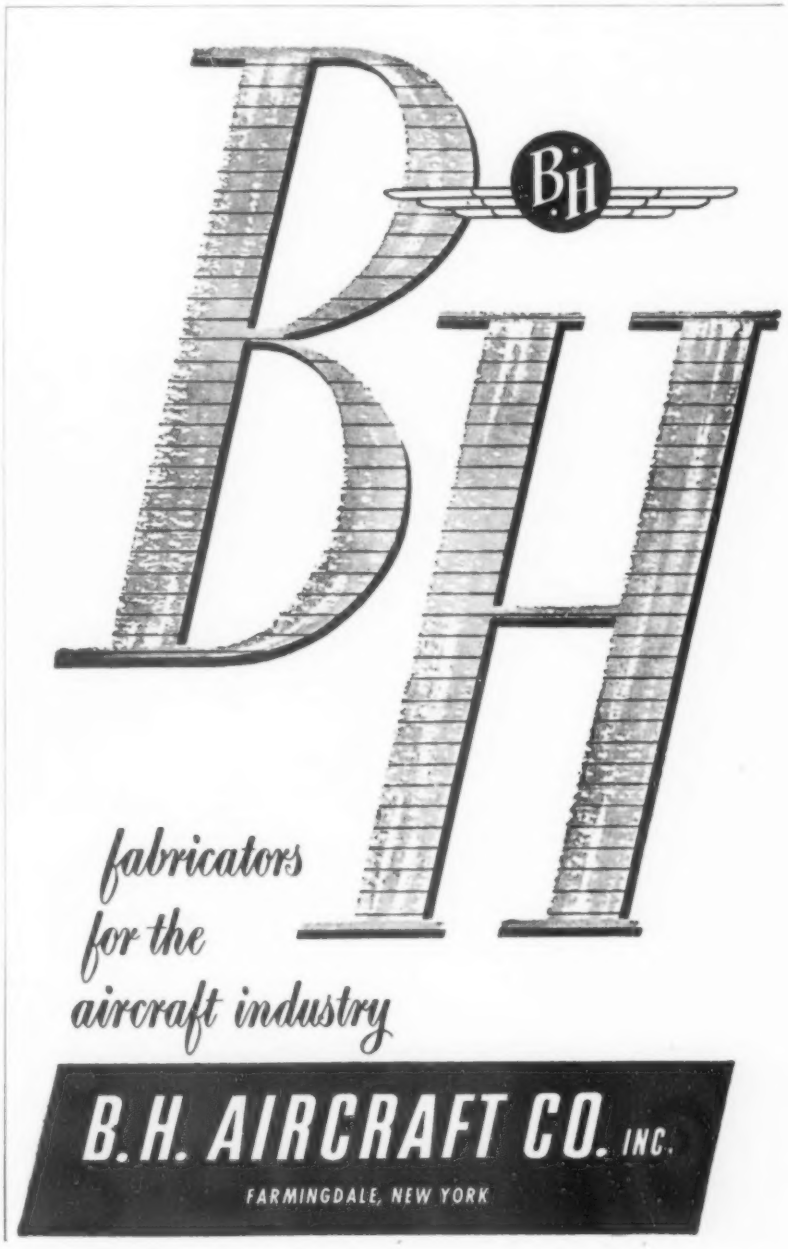
• **Coordination needed.** Because the landing operation is a cooperative effort between the air and ground, many agencies must agree on techniques and standards for the localizer, glide slope, marker beacons, lights, aircraft operation limits, and runways. The organizations involved are too numerous to list but their work includes international, U. S., commercial, and military efforts to coordinate and assist in improving the ability to approach under lower minimum weather conditions.

Having reviewed our progress in understanding the landing problem, let us look briefly at the equipment, devices, and gadgets that have contributed most of the answers we possess today.

▶ **The Landing System**—Starting with the landing system itself, we have learned that the beams are not precisely straight in the vertical and azimuth planes. They have distortions due to reflections in the vertical plane from the earth and from objects such as hangars and wires in the horizontal plane.

Because both of these sources of reflections are essential to an airport, we must learn to live with them, possibly devising radio schemes that will minimize or eliminate their effects.

Recent USAF, CAA, and ANDB



efforts to narrow the localizer beam have been encouraging. Other efforts along this line throughout the last decade include instrument landing systems at radio frequencies of 100 mc., 300 mc., 1,000 mc., 3,000 mc., 5,000 mc., and 10,000 mc.

Each of these developments held the promise of a successful landing system during its concept or evolution, but all fell short of the goal either in the execution of the concept or in deficiencies inherent in the equipment or radio frequency. However, several of these systems have been used for approaches down to about 200 feet.

▶**Microwaves Attractive** — Generally speaking, it appears that the microwave region (3,000 to 10,000 mc., or possibly 25,000 mc.) offers the greatest hope for the eventual solution of the radio part of the problem. Techniques applicable in this region provide means for projecting a radio path in space that is more nearly controlled to the desires of the designer and operator than are the techniques at lower frequencies.

Next, of course, we should question whether the designer really understands what solution is best. We are not certain, for example, that the path of the glide slope should be a straight line or whether it should flare exponentially near touchdown—and if it does flare, where does the flare start, where does it end? Similarly, should the localizer be perfectly straight or should it start with curved approaches leading to a straight course down the runway?

The use of the radio altimeter has provided a flare-out research tool. Although much enthusiasm for this technique was shown a few years back, interest has waned somewhat. The altimeter measures height and a flare-out computer determines rate of descent so that the rate of descent is reduced prior to touchdown, thereby creating a flared path. However, the radio altimeter measures the height of the aircraft above the objects over which it flies.

If perfectly smooth terrain could be provided along all approach paths the radio altimeter and flare-out computer probably would be an ideal solution. Lack of uniform terrain contours in the runway threshold region and the fact that the altimeter is called upon in the final phase without assurance that it is functioning is a serious obstacle to its operational use.

▶**Visual Aids**—When electronic men failed to produce a landing system after many years and millions of dollars, the visual people came up with such schemes as Fido, approach lights, and runway markings. After a decade of experiment and controversy on approach lights, it appears we are adopting a standard system with the full realization that lights simply do not penetrate certain types of poor visibility for any great distance.

Even though the lights provide an important visual transition for the pilot from the instrument landing system to the ground, the pilot still is unable to see the runway; he feels as if he were descending into a black hole. By painting certain geometric configurations of straight lines on a runway, the pilot is supplied with visual reference data that provides texture and sufficient alignment cues to guide him to touching the wheels to the runway and in steering the aircraft near the center line prior to deceleration to taxiing speeds.

Another attempt, a brute-force one, is to simply "burn off" fog and presumably other types of low weather. This is Fido and has received much attention in England and in certain parts of the United States where it has been installed experimentally at considerable expense. Generally, Fido too had its shortcomings: The tremendous amount of energy necessary to "burn off" the poor visibility is not only expensive but somewhat hazardous to the aircraft.

▶**Cockpit Instrumentation**—Many feel, and with justification, that the pilot has so much to do during an approach and landing, that the assimilation of information is the critical item in the instrument landing problem.

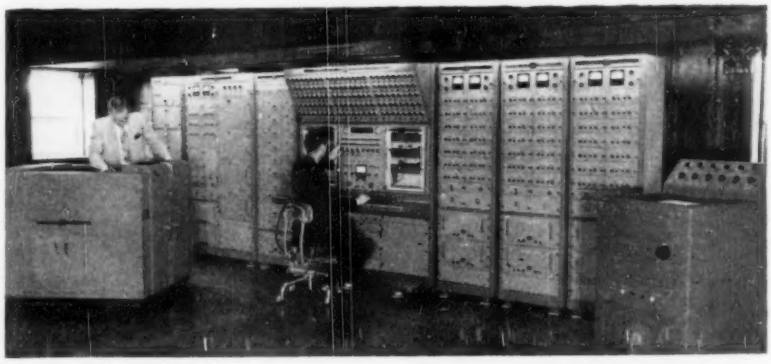
The pilot is compelled to watch (at least) the indications of the cross-pointer meter, the directional gyro, and the horizon instrument. As the cross-pointer meter travels toward the center of the instrument, the pilot glances to the directional gyro, hoping to find out how much it has moved toward the correct heading since his last visual sample, and thence to the gyro horizon to make certain that the pitch and roll are appropriate.

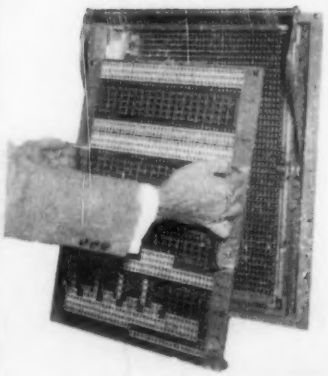
This continuous mental sampling and rate derivation is extremely taxing to a human pilot, particularly because it comes at the end of his mission, after he has been aloft as much as eight hours (for civil aviation) and perhaps 15 to 20 hours (for military aviation).

Flight directors such as the Sperry Zero Reader, Collins Integrated Flight System, and Bendix Omni-Mag can now do much or all of this computing for the pilot, giving him easy-to-follow approach instructions on a single instrument.

▶**Symbolic vs. Pictorial**—These flight directors are termed symbolic by the engineer in that they only symbolize the situation. Certain pitfalls in the symbolic approach suggest that the display should be in a more familiar form. The Collins IFS attempts to present a picture of sorts, but one mixed with several symbolic indications.

It is possible a flight instrument could be developed to give the pilot a mental image of his flight condition with re-





'Do-It-Yourself' Trend Spreads to Computers

Analog computation center, set up in former mansion near Princeton, N. J., by Electronic Associates, Inc., is available to industry on a rental basis. EA will rent machine time or provide qualified staff to set up and solve problems. Or the client may set up the problem in his own shop on plug-in-type problem board, such as the one shown at left, without tieing up computers. At the computation center, two problems may be solved simultaneously, using dual control consoles. Computing equipment includes 96 operational amplifiers, 15 servo multipliers, four servo resolvers and five servo-type function generators.

spect to the runway. If it could do this continuously and without deception, great strides could be made in instrumentation for landing. The pictorial addition of such factors as altitude, airspeed, pitch, imminence of touchdown, object motion, and depth, has not yet been demonstrated. But this area of instrumentation offers much promise.

This pictorial approach is extremely complicated because it involves pilot psychology and is subjective in its utilization by each pilot. A trained instrument pilot actually may do worse with a pictorial display than with a symbolic display. If pictorial displays offer the answer to landing instrumentation, the forthcoming generations of pilots may find the solution more palatable than the current generation, which has been trained with the conventional techniques.

▶ **Airplane & Autopilot**—The aircraft itself has been modified in some instances to make it easier to land under instrument conditions. Such things as automatic nose-wheel steering, swivel landing gear, automatic programmed flight, controlled braking, and various aerodynamic techniques have been tried.

The automatic pilot, which rapidly is becoming an integral part of the aircraft, has appeared in all forms, using displacement gyros and rate gyros, with controls that are displacement in nature, rate in nature, or merely stabilization of the manual control system.

The automatic pilot has made the aircraft easier to control, mainly because its sensitivities and time constants can be adjusted to provide optimum performance for a given airframe. However, if the airframe and powerplant do not lend themselves too readily to control, eventually the aerodynamicist and airframe designer must come to the aid of the autopilot and instrument landing designers.

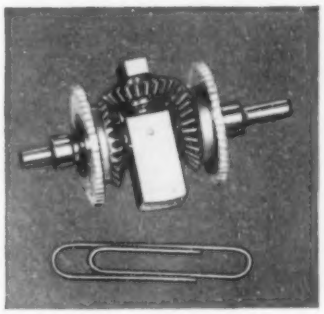
The completely automatic solution (autopilot and coupler) will probably be the first means for consistently going below 200-ft. ceilings. However, we must achieve greater autopilot-coupler–ILS reliability. Human beings understandably are reluctant to ride a robot while approaching the unseen earth at 150 mph. The human pilot will demand the instrumentation previously discussed for monitoring and human override in case of failure or malfunctioning of the automatic system.

▶ **The Human**—Not to be overlooked in this 10-year review is the pilot himself. Too often he has been ignored and told that the solution "would be available shortly in black box No. 13." Human engineers and psychologists have been paying more and more attention to the pilot in this critical phase of flight.

Such problems as fatigue, mental agility, physical coordination, visual,

the NEW

1/8" MECHANICAL DIFFERENTIAL from FORD INSTRUMENT COMPANY



- Operates in working circle of 1.000" max. diameter
- Lost motion does not exceed 12 mins.
- High sensitivity
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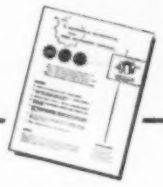

The 1/8" differential is the latest and smallest addition to the Ford Instrument line of single spider gear differentials. Engineered to highest military and commercial standards, this highly reliable unit provides extreme accuracy in additive and subtractive operations, while functioning with minimum friction and backlash.

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The MET-L-MATIC propeller is unique in its class particularly because of its design details, which greatly *reduce maintenance costs*. Only the MET-L-MATIC propeller features a separator which prevents the balls of the main blade bearing from rubbing against one another. Bearing failures due to chafing and galling are eliminated and bearing friction is greatly reduced. As a result, the pitch change is *smooth and surge*-free. And the savings effected in bearing maintenance far exceed the slight initial cost of this separator in the MET-L-MATIC.

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Sealed-in, factory-lubricated, pitch-changing mechanism.

No pitch-changing parts exposed to weather.

Hydraulically operated. Holds RPM accurately without wavering or surging.

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"World's largest maker of metal propellers for personal and business aircraft . . . more than 40,000 Met-L-Props, and now the new Met-L-Matic."

and aural cues all require considerable analysis to determine what is optimum for the pilot. Some believe this could be solved by the automatic operation; however, the mental strain on the pilot might be more of a problem than the problem of flying the aircraft manually.

Pilots react to landing under conditions of very low ceiling by considerable apprehension and mental stress, which tend to contribute to overshoots and missed approaches. The so-called "pilot's tranquility of spirit" is as important a factor as the straightness of the radio beam.

▶ **Measurements Needed**—Measurement of landing performance recently has received attention in order to evaluate quantitatively all factors involved, i.e. landing system, aircraft, and pilot. The object is to determine how each link in the chain performs; which is the weakest.

An overall concept of performance known as "approach success" has been developed and indicates to what ceiling and visibility the operation is safe before visual transition takes place (AVIATION WEEK Aug 25, 1952, p. 35). This concept includes such limitations as aircraft maneuvering, radio tolerances, and coupling methods. However, a measurement of why the approach was not successful or how to make it successful has yet to be developed.

No conclusions have been reached, but the technique of measurement is greatly improving and will be a powerful tool during the next few years. Measurements of the actual aircraft ground track, the actual ceiling and visibility conditions along the approach and in the threshold areas, measurement of pilot's eye motion and reaction time under actual instrument landing conditions and the coordination of all of these with conventional measurements of aircraft attitude, altitude, and speed have begun.

But the measurement tools are themselves only in an embryonic stage; good engineering practice requires that the yardstick be about one order of magnitude better than the object being measured for significant results to be obtained.

For example, too often a reported 500-ft. ceiling is actually a 200-ft. ceiling. An ANDB-sponsored program at Sperry Gyroscope Co. has done much to establish the limitations of current methods of visibility measurement and to indicate ways of improving and utilizing such data.

However, the tools themselves are somewhat inadequate. Visual interpretation is subjective; to relate measurements of a ceilometer or a camera to what a pilot sees is an illusive combination of psychological and optical measurements. Physiological measurements, such as pilot's eye movement under instrument conditions, have been made, but the "pilot-confidence factor" or "degree of tranquility" has not been determined. It is subjective and difficult to measure, but highly important.

▶ **ILS and GCA**—Landing equipments have emphasized visual cockpit instrumentation for the pilot in most instances. The success of GCA suggests several things. First, as a complementary system to ILS, it has greatly relieved the pilot by reducing his anxiety. He has a double check on position and track, as well as knowledge that the traffic on the approach path is being monitored.

GCA, being aural rather than visual, may have much to contribute because the pilot's aural sensory system has not received too much attention in the solution of this problem. The very fact that GCA is aural and ILS visual contributes much to their joint value.

In essence, GCA illustrates what the pilot ought to do without regard to the pilot's personal interpretation of the situation. By using information readily supplied by radar, such as ground track, ground speed, indications of other traffic, and the past track, the ground controller is, in essence, the computer.

Yet the ground controller lacks many pertinent facts, such as the plane's pitch, roll, and heading, details of the flight characteristics of the aircraft such as trim conditions, center-of-gravity conditions, wheels, and flaps, all of which contribute to a successful landing. GCA is also greatly dependent on the reactions of two human beings in a series.

In a combined GCA-ILS system some areas of overlap are desirable, some are undesirable, and in some areas neither system suffices. For example, both systems produce angular vertical beams resulting in overly sensitive and limited coverage signals near point of touchdown.

Each system was designed independently of the other, thus they may require complementary redesign for the future. The best of both systems may not be enough to take us significantly below 200 feet; aggressive steps in the areas of removing common weaknesses may be necessary.

▶ **Conclusions**—The past decade has provided a wealth of information, on all-weather landing. From it the following conclusions can be drawn:

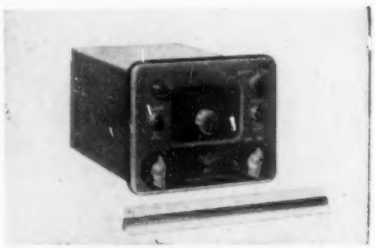
• **Development of a variety** of coordinated devices and operational methods is needed. Independent development of black boxes has carried us about as far as can be done by this method.

• **Past developments** in all areas should be analyzed and culled before going ahead.

• **The best of ILS and GCA** are inadequate and mutual weakness must be overcome, the techniques made more compatible.

• **Tools for measuring performance** of the landing system, the aircraft, and the pilot must be further advanced before there is hope of determining objectively what has been accomplished and what should be done next.

Once we reorient ourselves and get into the right frame of mind for the next decade of instrument-landing research, development, and utilization, we should formulate the objective of gathering fundamental data rather than of attempting another quick solution. We now understand the problem fairly well; its solution is worth considerable effort.



Lightplane VHF

Lightplane VHF transmitter-receiver, Model AR-1, weighing 4.5 lb., has continuously tunable superhet receiver covering range of 108 to 128 mc. and a crystal-controlled eight-channel transmitter with power output of 5.5 watts. Set price: $300, including power supply, two antennas, two crystals and other accessories. Manufacturer is Gonset Co., 801 S. Main St., Burbank, Calif.

FILTER CENTER

▶ **Fast Figuring**—Alwac electronic digital computer has been installed in Navy's David Taylor Model Basin, Washington, D. C., in the transonic division of the Aerodynamics Lab, where windtunnel testing of naval aircraft and guided missiles is conducted under sponsorship of BuAer. Alwac serves as the computer portion of a rapid data reduction section which measures, stores, plots and records pressures and forces on the model. Alwac was developed by Logistics Research, Inc., Redondo Beach, Calif.

▶ **Punch Cards Take Wings**—USAF recently transmitted information via a radio link directly from one set of punch cards at a North Africa airbase to another set of cards 3,000 miles away in Washington at a rate of 1,000 characters per minute. The technique, using a data transceiver developed by International Business Machines Corp., is expected to speed the transmission of statistical data, such as replacement parts information. —PK

LETTERS

Burbank Boggle

Our Pacific Coast manager, along with many hundreds of thousands of other people who live in the Burbank-Glendale area, has a bone to pick about the airline service they are receiving.

Specifically, these people, because of the inadequate service at Burbank, are required to drive 29 miles across the most congested city in the United States to get to Los Angeles International and in most instances Mama and the kids drive the same 29 miles back home. It seems that a number of them have taken it up with the Burbank people (Lockheed) and they are entirely sympathetic, but the CAB just does not believe that this situation exists.

Knowing your interest in some of those not-so-wellknown sidelights of the aviation business, I thought perhaps you would be interested.

W. M. C.

Shock & Vibration

In your June 28 "Letters," M. R. Seldon of Chance Vought Aircraft discusses the exchange of letters between F. A. Paul of Northrop and Maurice Gertel of Barry Corp. concerning the performance of vibration and shock isolators. He supports the premise that "vibration isolators may do more harm than good if we consider shock and resonance effects."

Mr. Seldon's letter was written last December at the time these problems were first posed to us by him and his company. Since then, with the cooperation of Mr. Seldon's group and Northrop, Robinson Aviation has conceived and fabricated a considerable number of engineered mounting systems which have successfully met service conditions involving both shock and vibration.

As has been pointed out, the characteristics required for ideal vibration isolation and those for shock attenuation are not entirely compatible. Furthermore, most specifications establish absolute limitations both as to dimensions and as to vibration performance. Older mount designs using rubber or damped springs for resilient elements required all of the dimensional allowance for attainment of vibration characteristics. Shock attenuation was not compromised; it was ignored, with the result that serious amplification of even low-intensity shocks would occur.

Starting with the mathematical premise that combination of shock attenuation and vibration isolation within a reasonable space necessitates compromise, an intelligent solution can be reached. Suitable non-linearity, both of spring rate and of damping, can be established to accomplish the maximum of each within a given allowable displacement. A unique new resilient material consisting of knitted and compressed wire mesh has been developed to produce just such optimum combination to meet the extreme operational requirements of delicate electronic equipments in today's guided missiles and supersonic aircraft. These resilient members possess three unusual characteristics:

- **Extreme reliability and durability** under changes resulting from variable altitude, speed and temperature.
- **Built-in inherent damping** due to design of cushion.
- **Non-linear load deflection curve,** providing extraordinary overload capacity and protection from intermittent dynamic loads.

When built into an engineered mounting system tailored to a specific equipment and environment, as contrasted with "catalog" unit mounts, the characteristics of this elastic material result in smooth, highly damped cushioning of large-excursion or high-energy disturbances without abrupt bottoming, while retaining the greatest possible measure of isolation for smaller amplitude steady state vibration.

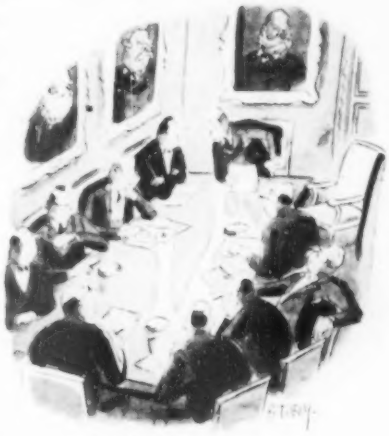
When specifications are made more practical to permit space modification and higher resonant frequencies, the resulting mounts repeatedly have been found to completely satisfy service requirements.

This knitted-wire energy-absorbing medium has been available commercially only since 1950 and is presently used exclusively in the all-metal mounts engineered and fabricated by Robinson Aviation, Inc.

Because of the urgent demands of the military it has not yet been possible to explore fully all of the possible adaptations. However, the recognition of the problems by groups such as at Chance Vought is bringing about revision of obsolete or unrealistic specifications. This will permit the isolator manufacturers to attack the design of engineered mounting systems compatible with the service conditions found in modern aircraft and missiles.

It is recognized that some problems involving the use of flexible mounts will be so obscure or so restricted as to require serious compromise despite the best efforts of the excellent technical staffs available in our specialized industry. However, it is being demonstrated daily that there are very few installations of delicate mechanical or electrical devices which cannot be materially benefited, often essentially so, by the use of correctly engineered mounting systems.

WILLIAM A. KEETCH
Vice President-Engineering
Robinson Aviation, Inc.
Teterboro, N. J.



"Where's George?"
"Oh, he won't be here 'til tomorrow
...we came by air!"

Unselfish Ads

I have just finished reading from cover to cover (as usual) the July 5 issue of AVIATION WEEK, and was struck first by Convair's attractive advertisement on the front cover and last by your fine editorial concerning it on page 98. I have shown these to several people here and we all agree that, as you say, the new Convair series is an outstanding example of unselfish advertising. We are not quite so sure that it is unprecedented.

You may recall that in 1949 United Aircraft ran two national advertising campaigns stressing the advantages of traveling and shipping by air. These two were devoid of any United sales message and were designed solely to stimulate wider use of commercial airlines by the public. Each year since then we have continued to run similar campaigns on air travel.

In addition, beginning in 1951 we have run a continuing series of advertisements on air power. These advertisements have been primarily designed to help the general public to realize the tremendous amounts of time, effort and money that are involved in achieving and maintaining adequate air power for our national security, and we believe they have served a very useful purpose.

Just in case you missed seeing them, I am enclosing a few examples of the more than 60 advertisements we have run in these various campaigns during the past six years.

NORMAN V. CLEMENTS
Director of Advertising
and Sales Promotion
United Aircraft Corp.
East Hartford 8, Conn.

Utmost Strength in an Emergency

The New Pacific HARNESS REEL

Meets new strength standards for safety

Conforming with Type MA-2 of MIL-R-8236 (USAF)

The new Pacific Harness Reel incorporates an entirely new principle of operation as well as being designed to meet the strength requirements shown necessary by high speed jet aircraft and aero-medical analysis of crashes.

The reel easily withstands an ultimate load of 4,000 pounds and at the same time is lighter, smaller, and much more versatile in installation. Pilot is protected against being thrown in any direction and the reel instantly locks upon uncontrolled acceleration of the pilot, yet the reel permits comfortable movement in performing regular duties.

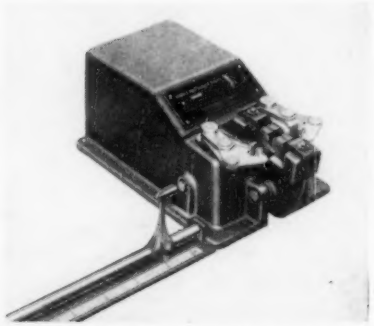
Write for New Bulletin

Pacific SCIENTIFIC CO.

1430 Grande Vista Ave., Los Angeles 23, Calif.

25 Stillman Street, San Francisco 7, California
1915 1st Avenue South, Seattle 4, Washington
111 B East Main Street, Arlington, Texas
Eastern Representative: Aero Engineering Inc.
Mineola, L.I., N.Y. • Indianapolis • Baltimore • Ottawa

NEW AVIATION PRODUCTS



SEMI-AUTOMATIC wire stripper and cutter.

Machine Cuts, Strips Wire in One Operation

Single-operation cutting and stripping of both ends of insulated wire is accomplished with a new semi-automatic production tool. The Mark 1 cutter-stripper is more than five times as fast as hand operators and three times as fast as motorized single-end cutting and stripping, says its manufacturer, who also states that inexperienced operators can produce up to 2,000 stripped lengths an hour. The wire is pulled through to the desired length, foot pedal depressed, and the rest of the action is automatic.

The machine handles solid or stranded wire, insulated with plastic, asbestos, nylon, Teflon or braided glass, in sizes from 14 gage to 24. An individual, easily installed-easily removed cartridge is used for each specific size. The maker claims that this is the only automatic stripping machine that removes glass-braid insulation cleanly and completely from stranded wire.

The new cutter-stripper is air-actuated, designed for minimum maintenance. Its output is said to compare favorably with more expensive fully automatic machines, except on very large production runs. Price, with set of cartridges for 18-gage wire, and foot pedal control unit including air hoses and bench stop: $249.

Technical Devices Co., 2350 Centinela Ave., Los Angeles 64, Calif.

Power Press Eliminates Need for Die Sets

A new one-ton precision power press is said to eliminate the need for die sets. Known as the Power-Di press unit, the machine takes punches and dies of any shape in retainers which are automatically aligned in opposing ram and bolster members.

The Power-Di takes up less space than conventional bench presses. Its maker suggests use of several in series for simultaneous notching, piercing or forming operations on large sheets which would otherwise require much larger dies and punch presses.

The tool is available as a bench or pedestal press, or as an operational accessory for Swanson Turret indexing units. It is a self-contained machine, with 1¼-in. standard stroke, 3 to 6-in. shut height, 200 strokes per minute operation.

Swanson Tool & Machine Products, Inc., Erie, Pa.

Spray System Boosts Efficiency of Cutting Oils

A spray system—designed to afford efficient utilization of cutting oils and drawing compounds to boost cutting feeds, speeds, and tool life—has been developed by C. A. Norgen Co.

Designated Spray-Lube, the system's flexibility permits the spray to be applied to the work area from any required direction and to as many points as necessary to cover thoroughly the critical areas of contact between cutting tool and workpiece, it is reported. Finely divided oil spray reduces friction and heat, for reduced tool temperature and longer life.

Individual metering at each mixing valve is provided. Character of spray can be controlled by simple adjustment of air pressure and liquid pressure regulators.

C. A. Norgen Co., 3455 South Elati St., Englewood, Colo.

ALSO ON THE MARKET

Non-magnetic metals may be fastened quickly to magnetic chucks on grinding tables with Scotch double-coated tape No. 400. Short strip of tape is applied to table's grease-free surface; protective paper is peeled off other adhesive surface of tape; object to be machined is placed on adhesive surface, which grips it securely.—Minnesota Mining and Manufacturing Co., 900 Fauquier St., St. Paul 6, Minn.

Tubeless aircraft tires offer 40% weight saving over conventional tubes, run cooler, are easier to install. They are now being test flown on military aircraft and by two airlines and have been ordered for several 1955 aircraft. Company says it is prepared to make them in any size desired.—Goodyear Tire and Rubber Co., 30 Rockefeller Plaza, New York.

nose for trouble

The big black nose of the CF-100—and what's inside it—is truly a mark of distinction. For it identifies the all-weather interceptor from the day fighter and, in the case of the CF-100, as Canada's Aerial Defender against bomber attack across the North.

The "insides"—a complex mass of radar and electronic equipment—is designed to guide the CF-100 Mk. 4 unerringly to its target, lock on and destroy it with a formidable armament combination of rockets and guns. The effectiveness of this search and fire-control system is being demonstrated almost nightly during mock interception exercises by R.C.A.F. CF-100 squadrons based at strategic points.

With its twin Orendas, also designed and produced by AVRO Canada, the CF-100 Mk. 4 has a greater range and more power than any other fighter-interceptor in service anywhere. The Orenda also powers the Canadair Sabre 5, the outstanding day fighter in service today.

For original Aeronautical design, plus efficient production, look to AVRO Canada.

AIRCRAFT DIVISION

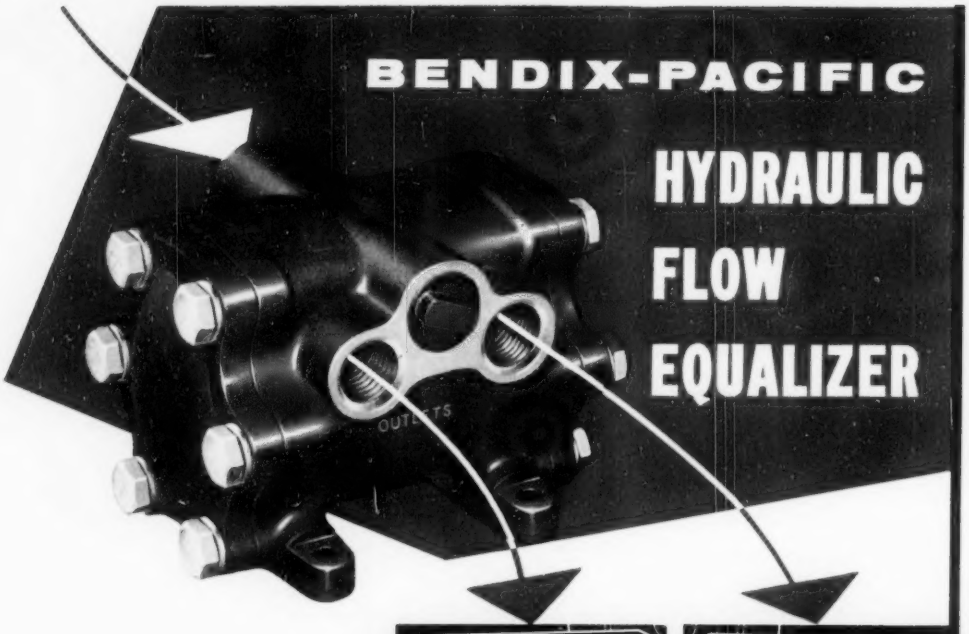
A.V. ROE CANADA LIMITED

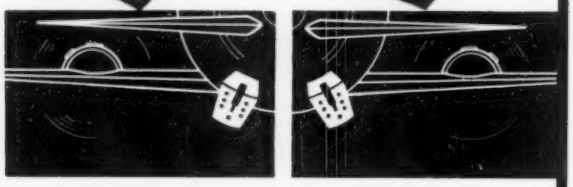
MALTON ONTARIO

AVRO CANADA

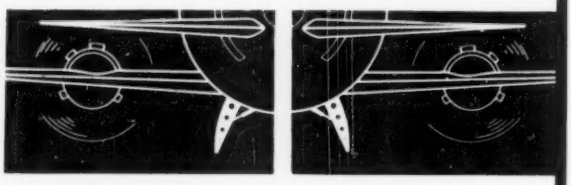
MEMBER OF THE HAWKER SIDDELEY GROUP

BENDIX-PACIFIC HYDRAULIC FLOW EQUALIZER

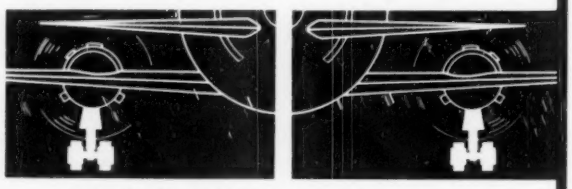




SYNCHRONIZES Dive Brakes



SYNCHRONIZES Bomb Doors



SYNCHRONIZES Landing Gears

This exclusive Bendix-Pacific Hydraulic Flow Equalizer-Proportioner will divide flow to the operated units in equal or fixed proportionate amounts, or will combine flows of different pressures from two operating units into a common line.

These units, available for both 1500 PSI and 3000 PSI systems, incorporate a balanced metering piston, and do not depend on mechanical action as the equalizing agent. Standard units offer accurate flow and pressure control over a wide range of flows. They can be adapted for use with virtually every type of fluid and because of their weight and compact design, installation space problems are minimized.

Bendix-Pacific Flow Equalizers also can be used to feed a third hydraulic system proportionately from a first and second system, or to split the output from one pump into two systems.

Write for Catalog 116.

RADAR

SONAR

HYDRAULICS

TELEMETERING

ELECTRO-MECHANICAL

ULTRASONICS

BENDIX PACIFIC

THE NAME Bendix AVIATION CORPORATION MEANS MORE

PACIFIC DIVISION • Bendix Aviation Corporation

11600 Sherman Way, North Hollywood, California

East Coast Office: 475 5th Ave., N.Y. 17

Export Division: Bendix International 205 E. 42nd St., N.Y. 17

Canadian Distributors: Aviation Electric, Ltd., Montreal 9

Airline Earnings and Cash Flow

1953 Operations

	Depreciation —(000,000 omitted)—	Net Income	Per Common Share	
			Earnings	Total Cash Flow[3]
American	$18.7	$12.0	$1.86	$4.74
Braniff	3.0	.01	0.01	2.35
Capital	2.3	1.7	2.10	5.08
Continental	.8	1.1	2.82	4.65
Delta & C&S[1]	3.8	(.04)[4]	...	6.35
Eastern	18.0	7.9	3.20	10.45
National[2]	2.0	4.0	3.99	5.89
Northwest	5.7	1.5	1.84	8.82
Pan American	18.4	10.8	1.77	4.78
TWA	23.5	5.1	1.52	8.56
United	17.3	8.5	3.28	10.31
Western	1.7	1.2	1.66	4.06

NOTES: (1) Nine months ended Mar. 31, 1954. (2) Year ended June 30, 1953. (3) Includes depreciation charges and net income. (4) Deficit.

SOURCE: Company reports.

Airlines 'Find' Cash in Writeoffs

There's lots of money in depreciation—Funds generated by aircraft amortization often far exceed net income.

Airline operations have reached an area where they contain an inherent measure of strength not always apparent in reported earnings. This is present in the heavy "non-cash" deductions generated by depreciation and related charges which do not represent any immediate cash outlay.

Since World War II, the airlines have made substantial additions to their equipment accounts. For example, the domestic and international trunklines increased their total assets from $574.5 million at the 1946 year-end to $1,055 million at the close of 1953. During this seven-year period, net property accounts—mainly flight equipment valuations—have increased from around $228.8 million to more than $552 million.

▶ **Net Worth Strengthened**—In expanding its equipment fleets, the industry has had to obtain considerable new capital funds to finance its programs. Such financing has been accomplished through the issuance of new equity securities and debt obligations. Most of the debt has been of a self-liquidating nature placed with private lenders such as insurance companies and banks.

In this process, coupled with retained earnings, equity or net worth positions have also been strengthened and broadened by considerable margins. For instance, the same group of airlines that had a net worth position of about $232 million at the 1946 year-end, had more than doubled this to around $510 million by the 1953 year-end.

▶ **Capital Base**—The net effect of these major transitions has been to place the capital base of the industry on a much higher plateau than at any time in the past. This places the group in a much better position to undertake any subsequent major capital expenditures with little, if any, recourse to more equity financing.

The self-generation of funds has now developed into formidable proportions, assuming a major impact on the industry's future financial development. The internal generation of funds arises primarily through depreciation cash throwoffs. They are deductions made before net income is determined but they are not "out-of-pocket" cash expenditures. Accordingly, they represent additional cash funds which can and will be applied for such purposes as acquiring new equipment, retiring debt, increasing working capital, and paying dividends.

▶ **'High Cash Flow'**—That the airlines' tremendous equipment expansion has created factors capable of generating non-cash charges of significant proportions became evident in 1953 published accounts. The accompanying AVIATION WEEK compilation reveals the magnitude of depreciation charges as compared with reported earnings for last year. It can be seen, for example, that while United reported net earnings of $3.28 per common share, the addition of depreciation charges helped make the "cash-flow" three times as great, or $10.31 per share.

With many of the major airlines completing their current equipment acquisition programs this year and next, depreciation charges should rise even more sharply, thus further augmenting "cash-flows" above and beyond reported earnings.

Most airlines use a seven-year period over which to amortize their aircraft in reporting to stockholders. However, for tax purposes, in recent years, carriers have utilized accelerated tax amortization certificates using 80% of cost over a five-year period.

▶ **'Big Four' Examples**—A number of examples illustrate the immediate trend ahead.

• **American's** 1954 depreciation charges will probably reach $22.5 million as against $18.7 million for last year. Despite the addition of its new DC-7 fleet in 1953 and this year, representing a $40-million investment, writeoffs should begin to decline in 1955 and in subsequent years very much below current levels as the older equipment is written off the books.

• **Eastern**, which shows a four-year depreciation period to stockholders, is expected to charge off about $24 million to depreciation in 1954 compared to $18 million in 1953. A somewhat higher figure is expected for 1955.

• **TWA** will have a temporary dip in depreciation this year to $21 million as against $23.5 million in 1953, but it is expected to show a rebound in this factor to $24 million in 1955.

• **United** is expected to increase its depreciation charges to $24.7 million for 1954 as against $17.3 million in 1953, rising sharply to $30 million in 1955.

The "Big Four" are expected to generate depreciation cash throwoffs of almost $275 million for the three-year period to end at the 1956 year-end. Such internally generated funds should at the same time write down on the books a healthy part of the new DC-7 and Super Constellation fleets being introduced, plus virtually all of the other aircraft installed in service during the earlier years.

With the widespread introduction of jet transports into commercial domestic service at least six or seven years away, the airlines may not be called upon to make substantial new capital outlays for some time to come. In the interim, as long as depreciation charges (and other costs) are covered by operating revenues, the industry should be able safely to amortize its outstanding debt, provide for near-term expansion programs, and in time probably be more liberal in dividend disbursements to its shareholders.

—Selig Altschul

IN PREPARATION for end of strike, AA mechanics ran equipment up daily to maintain planes in ready-to-go condition.

Truce or Peace? American Strike Ends

- **Airline restores full schedules as arbitrator gets 8-hr. flight-time issue; his decision will not be binding.**
- **Pilots agree to resume westbound nonstop service; carrier will not press damage suit for 60 days.**

By Richard Balentine

American Airlines is back in full operation this week for the first time in 29 days. But no one except the airline itself was optimistic last week as to whether its operations might continue uninterrupted.

A crippling 25-day-old strike called by Air Line Pilots Assn. to fight extension of the daily eight-hour flight-time rule was terminated temporarily at mid-week as participants signed a truce and named a neutral arbitrator to study the key issue.

He is David L. Cole, labor relations expert from Paterson, N. J., and one-time director of the Federal Mediation and Conciliation Service. Cole has been given no deadline to appraise the situation. His recommendations are not necessarily binding, since the issue now is in unofficial arbitration.

ALPA president Clarence N. Saven labeled the settlement "a truce." He said the union will be free to strike again if no agreement can be reached on the basis of Cole's recommendations.

▶**DC-7 Nonstop**—Meanwhile, American had its three westbound DC-7 nonstop transcontinental flights, scheduled at 8 hr. 35 min., in operation by the second day of operations last week. These are the flights that touched off the strike of 1,243 American pilots against the nation's largest domestic airline.

The airline agreed, however, to delay for 60 days any action on its $1,250,000 damage suit against ALPA (Aviation Week Aug. 9, p. 50.) The court approved and the case now is scheduled to be heard Oct. 21.

The suit, filed with Southern New York District Court, originally was scheduled for hearing Aug. 24.

American is asking $1 million for "compensatory damages," estimated at a rate of $750,000 per day. This was planned to accrue as the strike progressed.

The remaining $250,000 of the suit was brought by AA for alleged "illegal activity on the part of the union" in breaking its contract with the airline.

▶**Points of Agreement**—Aside from the postponed suit, other points agreed to by the airline and ALPA were:

- Operation of the disputed nonstop transcontinental flights.
- No pilots will be scheduled on intermediate stops of more than eight hours.
- Pilots went back on American's payroll, effective Aug. 25.
- Pilots would return to duty as they are required without loss of seniority and without recrimination.

Agreement between both factions came in a hurried two-day conference called by NMB member Leverett Edwards after informal conferences broke down abruptly the previous week (Aviation Week Aug. 23, p. 18).

▶**76% Operation**—The first day of its resumed operation, American had 40% of its equipment in action. By the second day, this increased to 76%.

The airline's immediate problem was gradual rejuvenation. Equipment had to be rejuggled so as to be in the proper place for the first day's operation. The 1,891 stewardesses, flight engineers and probationary employes already laid off had to be rehired. An airline spokesman said it was probable that the company would lose some of its former employes because of the layoff.

Two-week notices sent out to the company's 13,821 other employes, including president C. R. Smith, were immediately rescinded. The dismissal was slated to save AA $7.3 million a month. Revenue lost in the strike was

DURANICKEL

may easily provide the spring properties you need in a corrosion-resisting alloy!

You might look a long time before finding another alloy with all the advantages of Duranickel.

A wrought alloy, Duranickel is age-hardenable, or capable of having its hardness and strength increased by thermal treatment – and has the dependable corrosion resistance of Nickel.

And that's only the beginning! You can figure for yourself just how valuable Duranickel could be for a spring application of yours when you consider its other principal characteristics:

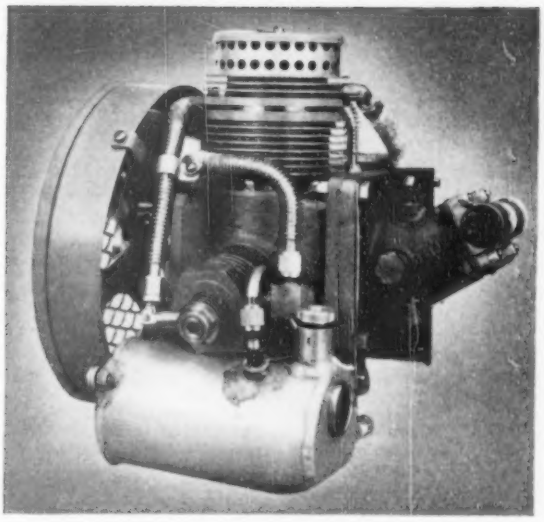
- **uniform spring properties at temperatures up to 600° F.**
- **high fatigue strength and endurance limit for non-ferrous, corrosion-resisting materials**
- **ready workability**

As a typical example of Duranickel's usefulness, let's examine briefly the new Kidde 4-stage compressor shown above.

Developed for pneumatically-operated airborne equipment, this lightweight compressor has neither connecting rods, wrist pins nor other complications required by conventional design. Instead, a crankshaft-riding cam simply pushes the pistons into their cylinders. A scotch yoke and sliding rod reverses the first piston while compressed air from preceding stages retracts the others.

Mechanical Property Ranges of Duranickel

Form and Condition	Tensile Strength 1000 psi	Yield Strength (0.2% offset) 1000 psi	Elongation in 2 in. per cent	Hardness Rockwell C
Rod and Bar				
Hot-finished	90-130	35-90	55-30	75B-22
Hot-finished, age-hardened	160-200	115-150	30-15	32-42
Cold-drawn, as-drawn	110-150	60-130	35-15	90B-32
Cold-drawn, age-hardened	170-210	125-175	25-15	32-42
Strip				
½ hard	130-155		15-3	25-34
½ hard, age-hardened	170-210		20-7	33-42
Spring	155-190		10-2	30-40
Spring, age-hardened	180-230		15-5	36-46
Wire				
Spring	160-200		5-2	
Spring, age-hardened	200-240		10-5	



SMALL COMPRESSOR delivers big volume at high altitudes. At 35,000 feet, this 4-stage, 4-piston air compressor delivers (from ambient pressure) one cfm of free air compressed to 3,000 psi. Its sea level delivery of 4 cfm of free air compressed to 3,000 psi can be maintained at high altitudes when inlet air is pressurized. The compressor weighs only 15 pounds, has first-stage valve of Duranickel, and Duranickel assist springs to insure closing of intake valves. *Photo courtesy of Walter Kidde & Co., Inc., Belleville, N. J.*

For the disc valve in the first stage which is intricately shaped and then heat treated, the design engineers of Walter Kidde & Company, Inc., specified age-hardenable Duranickel. They also called for Duranickel for valve assist springs.

Duranickel is well able to withstand the high temperatures encountered in meeting the severe requirements. It is not affected by moisture squeezed out of the air during compression. And it offers high strength to prevent warpage.

Put Duranickel down in your book for *workability*, too. It can be hot-worked, forged and cold-worked.

It is most readily machined in the annealed condition, and is commercially machinable in other conditions at hardnesses up to 275 BHN.

Duranickel can be joined by commonly-used welding, brazing and soft soldering processes, including inert gas metal arc welding.

You'll find detailed engineering data on Duranickel (and its companion alloys, Duranickel "R" and Permanickel®) in Technical Bulletin T-32, "Engineering Properties of Duranickel." A copy is ready and waiting for you. Write us for it.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street, New York 5, N. Y.

INCO TRADE MARK **Nickel Alloys**

MONEL® • "R"® MONEL • "K"® MONEL • "KR"® MONEL
"S"® MONEL • NICKEL • LOW CARBON NICKEL • DURANICKEL®
INCONEL® • INCONEL "X"® • INCONEL "W"®
INCOLOY® • NIMONIC® ALLOYS

Tomorrow's Aircraft . . . Today !

Some facts about the

famous AVRO VULCAN bomber

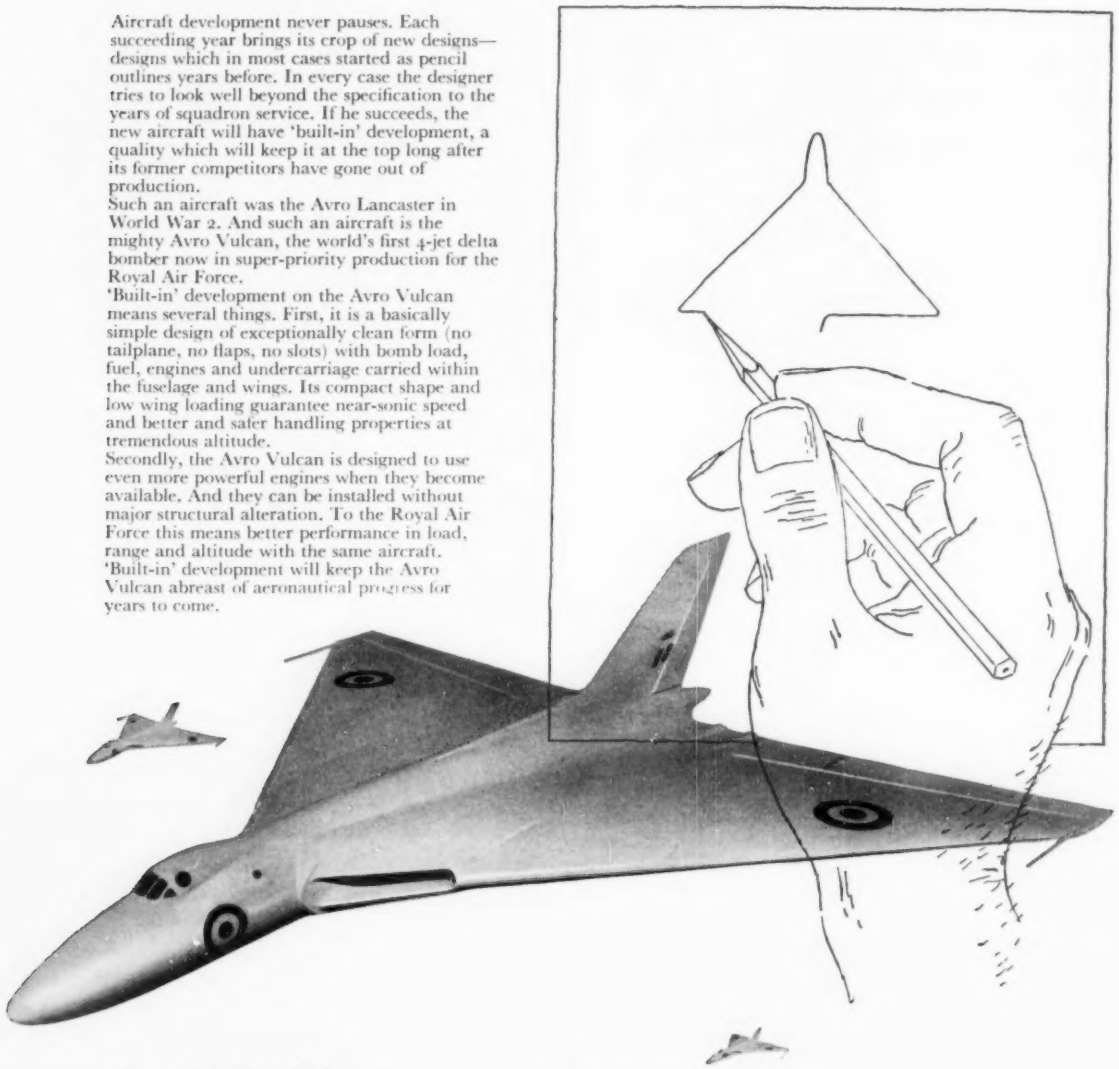
Aircraft development never pauses. Each succeeding year brings its crop of new designs—designs which in most cases started as pencil outlines years before. In every case the designer tries to look well beyond the specification to the years of squadron service. If he succeeds, the new aircraft will have 'built-in' development, a quality which will keep it at the top long after its former competitors have gone out of production.

Such an aircraft was the Avro Lancaster in World War 2. And such an aircraft is the mighty Avro Vulcan, the world's first 4-jet delta bomber now in super-priority production for the Royal Air Force.

'Built-in' development on the Avro Vulcan means several things. First, it is a basically simple design of exceptionally clean form (no tailplane, no flaps, no slots) with bomb load, fuel, engines and undercarriage carried within the fuselage and wings. Its compact shape and low wing loading guarantee near-sonic speed and better and safer handling properties at tremendous altitude.

Secondly, the Avro Vulcan is designed to use even more powerful engines when they become available. And they can be installed without major structural alteration. To the Royal Air Force this means better performance in load, range and altitude with the same aircraft.

'Built-in' development will keep the Avro Vulcan abreast of aeronautical progress for years to come.



A. V. Roe & COMPANY LIMITED, *Manchester/England*

AVRO MEMBER OF THE HAWKER SIDDELEY GROUP/PIONEER . . . AND WORLD LEADER IN AVIATION

AA'S SMITH: End is optimistic.

ALPA'S SAYEN: This is "a truce."

estimated by the airline at $18,750,000.

The American strike was the second longest in airline history. Trans World Airlines' wage fight with ALPA in 1946 lasted 26 days. The strike of National Airlines pilots in 1948 lasted a little over nine months, but NAL was in operation within a week after the pilot walkout began.

▶ **ALSSA Petition**—Several days before the company and union came to their truce agreement, Air Line Stewards and Stewardesses Assn., representing 1,000 stewardesses removed from American's payroll by the strike, petitioned CAB to revoke AA's operating certificates.

The association charged American with intentional failure to provide airline service and with failure to process the dispute with its pilots in accordance with the Railway Labor Act.

"We do not take any position with respect to the dispute between American and its pilots," Rowland K. Quinn, Jr., ALSSA president, said. "We do, however, believe that the company should and could have prevented the complete cessation of its vast operation and should and could have prevented the recent layoff of 1,000 stewardesses and other employes.

"The issue in the pilots' strike affects only three daily flights out of American's daily total of 366, or less than 1% of its entire operation. Before the strike, the pilots' association made frequent public announcement that there would be no strike if American would operate these three flights within the eight-hour rule while the dispute was processed under Railway Labor Act procedures.

"American refused to do this and elected to ground 366 flights even though only three were involved."

RAMP EQUIPMENT was stored in hangars by idled airliners awaiting back-to-work signal.

CAB Lists Findings In Three Accidents

Mechanical failures probably caused three U. S. airline accidents, Civil Aeronautics Board reports. The accidents, which resulted in some injuries but no fatalities, were:

• **Northwest Airlines'** Lockheed 1049 Super Constellation that practically was destroyed by fire following an emergency landing at McChord AFB, Tacoma, Wash., Sept. 6, 1953, while enroute to Chicago. Several of the 26 passengers were burned. Shortly after takeoff, the plane's No. 3 engine was cut because an overspeeding prop would not feather. Then No. 4 engine was feathered because of high engine oil temperature. Landing was made with insufficient hydraulic pressure in the secondary system to extend the landing gear fully in the time available.

A contributing factor, the Board says, was the design of the hydraulic system that did not permit use of the available pressure in the primary system for that purpose. Functional failure of No. 3 propeller governor was due to foreign metallic particles. Loss of engine oil supply for No. 4 engine could not be determined. Landing gear selector valve was seated improperly, resulting in insufficient hydraulic pressure.

• **Pan American World Airways'** Boeing 377 lost its No. 4 engine and propeller after little warning about halfway to Wake Island from Honolulu, Dec. 6, 1953.

Control was regained after losing considerable altitude, and the plane diverted to Johnston Island. None of the 35 persons aboard was injured.

The Board investigators commend the seven crew members for their action in handling the incident.

Probable cause of this accident, CAB finds, is propeller blade failure resulting in vibration that tore the engine from its mount. PAA has replaced the unplated blade used in favor of a nickel-plated type.

• **Continental Air Lines'** Convair 340 made an emergency wheels-up landing in a barren field shortly after takeoff from Midland, Tex., Mar. 16, 1954. Two of the 11 persons aboard suffered serious injuries.

Immediately after takeoff, the right elevator trim tab push-pull rod failed and the stub end became wedged, holding aircraft in nose-down position. The crew was unable to maintain control of the plane.

CAB investigators say the probable cause of this accident was a reversed installation of the right elevator trim tab idler as a result of the airline's use of the manufacturer's illustrated parts catalog as a maintenance reference.

CAB Rearranges Midwest Routes

TWA, Braniff, Delta-C&S and Continental lose some points to be served by Ozark and Lake Central.

Middle Western airline routes were rearranged last week when Civil Aeronautics Board, in renewing Ozark Air Lines certificate to Sept. 30, 1958, amended those of Lake Central, Continental, Braniff, Trans World and Delta-C&S by suspending service at certain points to be served by Ozark and LCA.

Ozark's regular routes were modified by:

- Eliminating La Salle-Ottawa, Ill., and adding Davenport, Iowa-Moline, Ill., as an intermediate point between Rockford and Peoria, Ill.
- Eliminating Galesburg and Bloomington, Ill., and Crawfordsville, Ind., and adding Davenport-Moline, in lieu of Galesburg, and adding Springfield and Decatur, Ill., as intermediate points between Peoria and Champaign-Urbana, Ill.
- Reconstituting Segment 3 of Ozark's routes by providing service between Chicago and Champaign-Urbana and Decatur, and between Chicago, and St. Louis via Champaign-Urbana and Decatur, Springfield, and Mattoon-Charleston, Ill.
- Eliminating Dyersburg, Jackson and Memphis, Tenn., Poplar Bluff, Mo., and Jonesboro, Ark., and adding Marion-Herrin, Ill., as an intermediate point between St. Louis and Cape Girardeau, Mo.
- Continuing Cairo, Ill., on a one-year experimental basis; and extending Segment 5 of Ozark's routes from Paducah, Ky., to Nashville, Tenn., via Clarksville, Tenn.-Ft. Campbell-Hopkinsville, Ky.
- Eliminating Miami and Tulsa, Okla., and adding Columbia, Mo., to Segment 6, permitting Ozark to serve Columbia and Jefferson City, Mo., as alternate intermediate points or on the same schedule if the carrier desires such an arrangement.
- Authorizing Ozark to provide service between Kansas City, Mo., and Jefferson City and Columbia, Mo., Quincy, Ill.-Hannibal, Mo., and Springfield, Ill., and beyond Springfield, Peoria and Bloomington, Ill.

▶ **Amended Certificates**—CAB amended Lake Central's certificate to authorize the airline to provide service between Indianapolis and Chicago via Bloomington and Terre Haute, Ind., and Danville, Ill.

Continental's amended certificate includes Bartlesville, Okla., as an intermediate point between Tulsa and Kansas City, subject to the restriction that all flights serving Bartlesville on this segment shall originate or terminate at Wichita Falls, Tex.

Delta's flights to Terre Haute, Ind., were suspended during the period in which LCA serves that point.

CAB suspended TWA service at Quincy, Ill.-Hannibal, Mo., during the period Ozark serves that point. Braniff lost Jefferson City, Mo., during the same period.

▶ **Skip-Stop**—The Board also authorized Ozark to provide skip-stop service over its route.

"After analyzing the routes and schedules of the trunkline carriers serving this area and noting the type of equipment used by them in rendering their service and bearing in mind the needs of the various points involved," CAB said, "we have come to the conclusion that the conditions we have referred to can be met by requiring:

- "That a point must be scheduled to receive at least two roundtrips per day before Ozark will be permitted to skip-stop such point.
- "That Ozark schedule at least two stops on all flights between terminals whether such terminals be on the same or different segments."

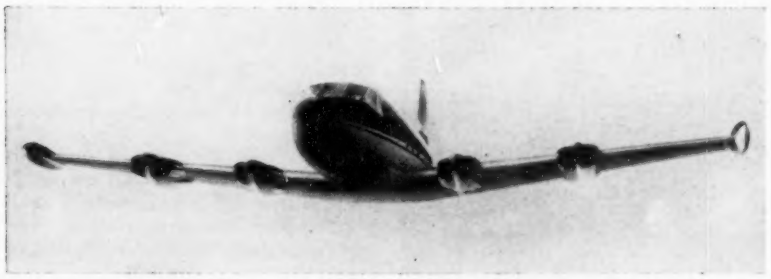
CAB Chairman Chan Gurney and member Oswald Ryan dissented from the other three members on this one point:

"Our point of difference concerns the failure of the Board to impose an appropriate restriction in Ozark's certificate which would prevent that carrier from conducting operations between Chicago and St. Louis via Peoria and Springfield, an operation which is made possible as a result of the combination of the Milwaukee-St. Louis and Kansas City-Chicago segments awarded to the carrier herein.

"Unless otherwise restricted, Ozark will be able to provide service over such a routing, which would be a point-to-point duplication of American Airlines' present trunkline service.

"This Board has always been careful to avoid uneconomic paralleling of routes between local service carriers and trunkline carriers. In this case, the Board had the opportunity to suspend American's service at Peoria and/or Springfield, and, if it had done so, the present problem would have been avoided.

"Having concluded, however, that neither of the suspensions is required by the public convenience and necessity, it is clearly the duty of the Board under the economic provisions of the Civil Aeronautics Act to so circumscribe Ozark's operations as to prevent uneconomic competition. The Board's failure to do so here is inconsistent with its previously expressed policies and with the requirements of the Civil Aeronautics Act which call for the avoidance of unnecessary and wasteful duplications of service."



Artist's View of Cessna Light Transport

Sketch of Cessna's latest business transport project, the Model 620, scheduled to fly early next year (Aviation Week Aug. 9, p. 17). Powerplants are 320-hp. Continentals turning three-blade props. Model 620 is designed to seat from eight to 10 passengers. Informed sources say the new plane will be priced between $250,000-$300,000.

Pan American Wins Frye Airline Trophy

Pan American World Airways has been awarded the Frye Airline Performance Trophy for 1953 for pioneering in the use of the upper-air "jet stream" in regularly scheduled commercial flight.

The award was presented to PAA president Juan T. Trippe by Vice President Richard M. Nixon in Washington, D. C. on behalf of the award committee, whose members included Maj. Alexander P. de Seversky, chairman; Gen. Carl Spaatz; Oswald Ryan; C. S. (Casey) Jones, and John B. Walker.

Pan American won the trophy for its scheduled 3,846-mi. nonstop flights from Tokyo to Honolulu through the Pacific "jet stream" at an average block-to-block speed of 334.44 mph. in 11 hr. 30 min.

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CAB ORDERS

(Aug. 11-18)

DENIED:

Capital and Delta-C&S Air Lines request for reconsideration of an order denying consolidation of applications in a petition by Peninsula Airport Commission, Newport News, Va., for amendment of the Civil Aeronautics Act concerning certain routes of Eastern and National Airlines.

United Air Lines' complaint against Flying Tiger Line for FTL's operation into Salt Lake City, a point not on Tiger's certificate.

Twentieth Century Airlines' petition for reconsideration of a previous Board order that denied the nonsked's request to permit two former employes, Daggett Howard and Louis W. Goodkind, to testify in current enforcement proceedings against the company concerning matters ascertained in the course of their employment with CAB.

North American Airlines' motion for reconsideration of a former CAB order that consolidated a portion of the nonsked's application in the additional Southwest-Northeast service case.

American, United, Trans World and Delta-C&S Air Lines an exemption to permit them to furnish reduced rate transportation at a charge of 50% of its published tariff for registered delegates to the annual convention of the American Society of Travel Agents from any point on their routes to San Francisco from Oct. 24 to Nov. 12.

APPROVED:

Interlocking relationship between Gilbert Air Transport Corp. and A&B Delivery of Chicago, Inc., arising from Milton Gilbert's positions as president and director of both firms.

Intercompany arrangements between Eastern and Delta-C&S and various other air lines.

ORDERED:

Foreign air carrier permit issued to Iberia, the Spanish Airline, in order to serve New York.

Investigation of Braniff Airways' proposed reduced roundtrip fares between various points for family groups traveling on Saturdays and Sundays.

Investigation of Slick Airways' proposed increased general commodity rates between St. Louis and Long Beach, Los Angeles, Oakland, San Diego and San Francisco and a proposal to cancel certain specific commodity rates applying from Los Angeles, Oakland, San Diego and San Francisco to St. Louis.

AMENDED:

Seaboard & Western Airlines' exemption to carry passengers abroad to permit return of a certain group from Beirut, Lebanon, on or about Aug. 15.

GRANTED:

Paso Robles, Calif., city and county of San Francisco, city and chamber of commerce of Eureka, Calif., Humboldt County and its chamber of commerce and Redwood Empire Assn. leave to intervene in Southwest Airways Co.'s application for renewal of its amended certificate of public convenience.

Petition by Metropolitan Airport Authority of Rock Island County, Ill., requesting the Board to hold a public hearing on the question of whether the public interest will be affected adversely if Ozark Air Lines continues to serve Davenport, Iowa-Moline, Ill., through Davenport Municipal Airport rather than through Quad-City Airport.

Delta-C&S Air Lines leave to intervene in an application by Aerovias Venezolanas, S. A., for a foreign air carrier permit to serve Miami, Fla., and New Orleans.

DISMISSED:

Twentieth Century Airlines' application requesting production of certain Board memorandum, dated Sept. 16, 1948, and bearing the signature of Louis W. Goodkind, since it already has been admitted into evidence in the enforcement proceeding against the nonsked.

Conner Air Lines' application for a temporary exemption to permit it to transport agricultural laborers between U. S. and points in the Caribbean.

CANCELED:

Air Services, Inc., letter of registration.

FIXED:

Final mail rates of Northern Consolidated Airlines.

FTL-Slick Merger Snags on Labor Rule

Merger of Flying Tiger Line and Slick Airways was snagged last week on the labor protective provisions of the Civil Air Regulations that Civil Aeronautics Board imposed on the two cargo airlines when it approved the consolidation last January (AVIATION WEEK Jan. 18, p. 80).

The companies now find that implementation of the provisions with 900 employes of both airlines, laid off since Mar. 26, 1953, could bring about a financial crisis for the merged line.

► **Sum 'Too Great'**—"The sum total of claims to be faced upon a merger, to be paid or to be denied and arbitrated, is of a magnitude patently too great to be sustained by the surviving corporation in the projected merger," the airline told CAB.

The labor protective provisions provide that any employe "separated, displaced, demoted or moved" as a result of a merger is eligible for compensation either in a lump sum with severance pay or in a guarantee of 60% of his salary up to 48 months or a year's salary, depending on the employe's seniority.

"The pending merger is endangered and the companies faced with disaster as a result of the labor protective provisions to a complex of employe relationships, which has been created in the long period since the execution of the merger agreement March 1953," the companies told the Board.

► **Revenue Reverses**—In that period both Slick and Tigers have suffered considerable reverses in business because of:

- Phaseout of the Korean airlift.
- Contract for pattern flight for Navy expired.
- Other military business has slumped.

Slick's business volume dropped by 33% since March 1953, Tigers by 49%, the airlines reported Slick operated at a break-even figure at the close of December 1953. In the first six months of this year, the airline lost $659,203.

FTL made more than $150,000 per month before taxes during 1953. During the first six months of 1954, Tigers reported a loss of $1,157,928.

The two airlines figure that termination costs from claims filed by laid-off employes could run as much as from $200,000 to $500,000. Thus the airline is asking that a modification of the labor protective provisions be accomplished by the Board within the next few weeks.

"The companies cannot long continue their present operation suspended in mid-air, neither merged nor independent," FTL and Slick told CAB. "If relief is not forthcoming, the merger must be abandoned and the companies must take steps to protect their respective stockholders."

► **Quick Action**—Early in the year, when CAB approved the merger, the companies did not anticipate this problem because they expected consolidation to be accomplished much sooner. Personnel change would have been readily ascertainable and the "resulting liability clearly circumscribed," the airlines said.

The airlines' petition should bring about some quick action by the Board. Joseph H. Fitzgerald, director of CAB's Bureau of Air Operations, recently sent CAB attorney Albert H. Ruppar to Los Angeles to "assure that a proper record is developed which will serve as a basis for decision by the Board" in the merger proceeding (AVIATION WEEK Aug. 23, p. 58).

Tigers' attorney Norman L. Meyers said last week the projected merger action now is at an impasse. Unless the Board moves quickly, the whole idea will be abandoned, he said.

Fares Up 5%

(McGraw-Hill World News)

Melbourne—Passenger fares and freight charges on major Australian air routes are up 5%.

Trans-Australia Airlines and Australian National Airways are charging $20.25 for the 600-mi. flight from Melbourne to Sydney. Ansett Airways' aircoach service is about 10% less, and the airline also gives family rates.

SHORTLINES

▶ **Aeronaves de Mexico** has granted a contract to Gulf Oil Corp. for exclusive supply of the airline's aviation lubricating oil.

▶ **Aerovias Brasil, S.A.,** this month opened ticket offices in New York and Washington, D. C., under the airline's new program of "aggressive . . . traffic development." . . . Aerovias has contracted with Aerodex, Inc., Miami, for turn-around service for its three DC-4s.

▶ **Allegheny Airlines** carried its millionth passenger Aug. 16.

▶ **British Overseas Airways Corp.** carried 2,970 passengers on its trans-Atlantic Monarch flights during the June 20-July 17 peak season, a 5% increase over the same four weeks last year.

▶ **Canadian Pacific Airlines** has inaugurated a second weekly DC-6B service between Vancouver and Hong Kong via Tokyo.

▶ **Central African Airways** carried 12,475 persons 7,165,577 passenger-miles during July, the first time the airline topped the 7-million mark.

▶ **Central Airlines** flew 817,858 passenger-miles in July, 68% higher than the same month last year.

▶ **Continental Air Lines** plans to increase its advertising budget by "several thousand dollars" to launch a campaign aimed at converting long-distance auto travelers to commercial air transport.

▶ **Cubana** has secured a $4,208,500 loan from the Agricultural & Industrial Development Bank of Cuba, plans to use the money to pay for three Lockheed Super Constellations on order and three L-049 Connies.

▶ **Delta-C&S Air Lines** has set up a customer service committee to study ways of maintaining the "highest standards of . . . customer service."

▶ **Iberia Air Lines** of Spain was scheduled to inaugurate nonstop New York-Madrid service Aug. 30, operating three roundtrips weekly with combination first class-aircoach Lockheed 1049E Constellations.

▶ **International Air Transport Assn.** will discontinue its consolidated tariffs project and cancel six existing tariffs publications Oct. 1.

▶ **International Civil Aviation Organization** has signed Sweden and Libya, increasing ICAO membership to 23 nations.

▶ **Japan Air Lines** will increase its trans-Pacific DC-6B flights on the San Francisco-Tokyo route from two to three a week Sept. 1.

▶ **KLM Royal Dutch Airlines** carried 313,503 passengers during the first half of this year, an 18% increase over 1953. Passenger-miles totaled 438,023,000, compared with 369,564,940.

▶ **Lake Central Airlines** will add Danville, Ill., and Terre Haute, Ind., to its Chicago-Indianapolis route Oct. 19 and offer additional service to Bloomington, Ind., increasing its network by 215 miles.

▶ **National Airlines** flew 58,662,000 revenue passenger-miles during July, compared with 48,417,000 for the same month last year.

▶ **North Central Airlines** carried 30,671 passengers in July; this is 1,911 more than in June and an increase of 27% over July 1953.

▶ **Northeast Airlines** carried 74,449 passengers during July, a new company record credited to its new New York-Boston vacationer shuttle service.

▶ **Panagra** flew 72,063,000 revenue passenger-miles during the first half of this year, a 7% gain over the first six months of 1953. Revenue ton-miles totaled 9,500,000, an increase of approximately 400,000.

▶ **Pioneer Air Lines** carried 14,055 passengers during July, setting a new company record for the month.

▶ **United Air Lines** flew 324,124,000 revenue passenger-miles during July, a 24% gain over the same month last year. UAL also logged: 9,021,000 revenue plane-miles, a 17% increase; 2,738,000 cargo ton-miles, up 25%; 1,723,000 mail ton-miles, a 15% gain, and 767,000 express ton-miles, down 1%.

Iron Curtain Gate

(McGraw-Hill World News)

HELSINKI—Finnair will open a new Helsinki-London route Sept. 1 to handle rapidly increasing traffic between this "gateway to the East" and Western Europe.

The airline plans to operate aircoach Convair 340s on three roundtrips each week.

AVIATION CALENDAR

Sept. 4-6—1954 National Aircraft Show, James M. Cox Municipal Airport, Dayton.

Sept. 7-12—Society of British Aircraft Constructors, 1954 Flying Display, Farnborough, England.

Sept. 8-11—Symposium on propagation, standards and problems of the ionosphere. Central Radio Propagation Laboratory, Boulder, Colo.

Sept. 13-17—International Air Transport Assn., 10th annual general meeting, Hotel de la Rochefoucauld, Paris.

Sept. 13-19—Civil Aeronautics Administration, first postgraduate course in civil aviation medicine, Ohio State Universtiy, Columbus.

Sept. 13-24—Instrument Society of America, first International Instrument Congress and Exposition and third annual Analytical Instrument Clinic, Philadelphia.

Sept. 19-21—International Northwest Aviation Council, 18th annual convention, Hotel Vancouver, Vancouver, B. C.

Sept. 21-23—Society for Experimental Stress Analysis, annual meeting and exhibition, Bellevue-Stratford Hotel, Philadelphia.

Sept. 22—Southwest Airmotive-Pratt & Whitney Aircraft, engine maintenance and operation forum, Love Field, Dallas.

Sept. 30-Oct. 1—Radio Technical Commission for Aeronautics, fall assembly, Washington, D. C.

Oct. 1-2—Airmail Pioneers, division reunion, Lexington Hotel, New York.

Oct. 4-6—Tenth annual National Electronics Conference, Hotel Sherman, Chicago.

Oct. 5-7—Champion Spark Plug Co., 10th annual Aircraft Spark Plug and Ignition Conference, Secor Hotel, Toledo, Ohio.

Oct. 5-9—Society of Automotive Engineers, National Aeronautics Meeting, Aircraft Production Forum and Aircraft Engineering Display, Hotel Statler, Los Angeles.

Oct. 11-12—Aircraft Industries Assn., symposium on titanium parts, Cleveland.

Oct. 13-14—American Assn. of Airport Executives, 1954 conference on airport management and operation, University of Oklahoma, Norman, Okla.

Oct. 14-15—Institute of the Aeronautical Sciences and Canadian Aeronautical Institute, joint meeting, Montreal.

Oct. 17-22—International Union of Aviation Insurers, annual general meeting, New York.

Oct. 18-22—National Safety Council, Aeronautical Section, Conrad Hilton Hotel, Chicago.

Oct. 23—Airmail Pioneers, division reunion, VFW Club, Elmhurst, Ill.

Nov. 8-9—National Aviation Trades Assn., annual convention and meeting, Biltmore Terrace Hotel, Miami Beach, Fla.

Nov. 8-10—Air Industries & Transport Assn. of Canada, annual meeting, Chateau Frontenac, Quebec City.

Nov. 9-12—Air Line Pilots Assn. convention, Sheraton Hotel, Chicago.

Nov. 11-12—Airmail Pioneers, division reunion, Hollywood Roosevelt Hotel, Los Angeles.

Nov. 15-17—Aviation Distributors and Manufacturers Assn., 12th annual meeting, Mayflower Hotel, Washington, D. C.

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(Additional Position Vacant Advertisements on pages 61 & 62)

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THE NEW U.S. AIR FORCE

Shortly after entering office, the Eisenhower Administration launched a sweeping program of economy, efficiency and modernization in the U. S. Air Force, as in other agencies. Air Materiel Command already was working on decentralization. Because of the complexity and size of the effort, and a shortage of space, the press has omitted many details of this significant change in attitude and procedures.

The editor of AVIATION WEEK *has been conducting a study of this new Air Force, its philosophy and accomplishments, and we have talked to some of the men directing the program. We have decided that* AVIATION WEEK *should devote a liberal and special appropriation of space for a more complete report to our readers on this subject. Beginning here today, we start a series on the new U. S. Air Force, especially its management aspects, since procurement developments have been outlined consistently in this magazine from week to week.*

The series will incorporate authentic source material, official statements, progress reports, and analyses that will help our readers understand better the day-to-day evolutionary events as they are reported at the Pentagon and at air installations all over the world.

Following are extracts from a progress statement made May 25 by H. Lee White, Assistant Secretary of the Air Force for Management, before the Senate Appropriations Committee. The first two paragraphs, however, appeared in the USAF Management Improvement Report for fiscal 1954. —RHW

Management and Operation

By H. Lee White

The Air Force has made substantial progress toward its goal of attaining maximum effectiveness in its operations at a reduced cost in money, manpower, facilities and materiel. . . . Not only have many operating deficiencies been isolated and corrected but new ways have been sought to do the same creditable work with ever decreasing resources.

In the face of an austere budget and a requirement to increase our combat capability, it becomes more and more evident that the "belt tightening" process will of necessity continue. If the problems generated . . . can be even partially solved through our own efforts to increase effectiveness at a lower cost, the accruing benefits will be of significant value not only to the Air Force but to the American public as well.

CARRYOVER CREATED

It has appeared from reviews that approximately $1.905 billion of funds (excluding public works) previously appropriated could remain unearmarked for specific programs and would, therefore, be available to apply against our fiscal 1955 program.

This means that, for the first time in many years, it has been found possible actually at an early date to count on a carryover of substantial unprogrammed funds for the following year. As these funds have been freed by our reprogramming and contract cancelation recoveries, I have directed that they be placed in administrative reserve. Already the total of $1.905 billion has been specifically directed to be placed in administrative reserve and $1.060 billion have actually been transferred, as of this date, to the reserve. The application of the $1.905 billion to the financing of requirements for fiscal 1955 has reduced the amount that otherwise would be required for appropriation for the fiscal 1955 program.

I particularly invite your attention to the fact that this is not an estimated carryover in the usual sense of failure to obligate funds as programmed. This is a carryover created out of program reviews and revisions initiated to postpone to the feasible maximum, our obligations and expenditures. I make such a point of this because I believe that it demonstrates that the Air Force is doing a conscientious job in incurring obligations and expenditures only as absolutely justified.

There has been established an Expenditure Reduction Program. This program was initiated on Aug. 20, 1953 and is monitored by the Deputy Chief of Staff, Comptroller and my deputy for budget. A searching inquiry was made and is continuing to be made in various areas of the Air Force as to where actions might be taken which will result in ultimate reduction of expenditures without adversely affecting Air Force programs. The areas selected for study have been assigned to that agency of the Air Staff having cognizance, action dates are established and the studies are followed up by the Comptroller's office and by my deputies.

I would like to indicate some actions during the past years in the area under my cognizance to reduce costs and improve efficiency.

FISCAL MANAGEMENT

At the end of March 1954, we had completed the installation of a Monetary Inventory Accounting System at all Air Force bases world-wide and at all Zone of Interior Air Materiel Command depots. Inventory accounting systems are being designed for each of the overseas depots and are scheduled to be installed by June 1955.

Other phases of inventory accounting, necessary for the complete control of supplies from the time of acquisition until consumption, are rapidly being completed. When all phases are completed we will have a closed inventory accounting system tied to our cash and general books of account. It is a 12-phase program which we plan to complete in two years.

Monetary Inventory Accounting, supplemented by detailed quantity data on our 1,200,000 items, provides management with summary information not previously available. We will have dollar totals covering on hand, on order and consumption in each property class. The dollar common denominator makes it possible for supply management to know the status of our inventory, where we are heavy, where there is little activity, where we must take action to reduce stocks, cut handling costs and reduce warehouse requirements. Dollar inventory figures will give us stock turnover rates in each sub-property class and will provide broad checks on the computation of item requirements.

In July 1954, we will install an Air Force-wide general accounting system which will include for the first time accounts for supplies, equipment and fiscal assets. Under this system and because of these additional assets accounts we will be able to relate the annual expenses of operation to the funds appropriated for that year. This will be a commercial-type accounting system, a first step toward the more complete system contemplated in the Air Force Financial Control Plan published last November.

We are currently testing all of the base level accounting aspects of the Air Force Financial Control Plan at three Air Force bases. This plan emphasizes accounting for resources consumed and the control of asset levels. Accounting is done and reports are made for all activities for which a manager at any level is responsible. Our commander-managers will receive commercial-type statements of assets

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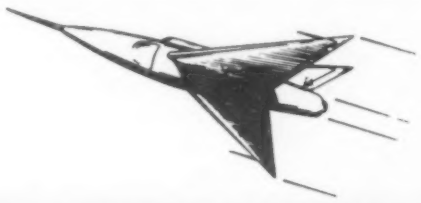

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(*Continued from page 64*)

and expenses upon which to base operating decisions and budget estimates. We at Headquarters will be in a position to compare the cost of operating one establishment against the cost of operating a similar establishment. .

Since last July we have added the aviation petroleum and medical-dental divisions to the Air Force Stock Fund. A charter for an industrial fund to cover all printing plants in the Air Materiel Command has been approved. This industrial fund will be set up during the next fiscal year. A plan for operating laundry and dry cleaning plants under an industrial fund has been prepared. A laundry accounting system has been outlined and will be developed, tested and installed during the next fiscal year. Other areas susceptible of operation under a working capital fund arrangement are being studied.

MANPOWER AND PERSONNEL

Last year in the presentation of the 1954 budget, it appeared that the Air Force would, with 960,000 military personnel, man an Air Force of 110 wings at the end of fiscal 1954. Actually, under the manning standards and manpower policies existing at the beginning of calendar 1953, the valid requirement for the 110-wing force appeared to be 997,000 military personnel, 1,031,000 military personnel for 115 wings to be activated by end of fiscal 1955, and 1,053,000 military personnel for 120 wings to be activated by the end of fiscal 1956.

As a result of the various actions that have already been taken, by the end of fiscal 1954, the Air Force will have activated 115 combat wings instead of 110, together with three essential Air Transport Squadrons and several miscellaneous flying units previously considered to be beyond our capability, and we will do this with not more than 955,000 military personnel.

In other words, we will have activated five more wings than were contemplated with a military manpower cost of at least 42,000 less than was estimated for the smaller force; or looking at it another way the estimate for the 115-wing force under the present manpower and personnel policies, is at least 76,000 less than was considered necessary under the manpower policies in existence at the beginning of calendar 1953.

On the basis of manpower savings already accomplished the Air Force will be able to man 120 wings by the end of fiscal 1955 with not more than 970,000 military personnel. In other words, they will man this force with at least 83,000 less military personnel than was estimated under the manpower policies in existence at the beginning of calendar 1953 for the 120 wings and at the same time have these 120 wings at least one year earlier than originally estimated.

At this point in time, and taking into consideration only these same actions and the results obtained from them to date without considering any additional programs under consideration or additional results coming from the programs already put into effect, it would appear that the Air Force would need 1,018,000 military personnel to man 127 wings by the end of fiscal 1956 and 1,042,000 military personnel to man 137 wings by the end of fiscal 1957. However, the Air Force, military and civilian alike, is firmly of the opinion that the policies put into effect this year and additional policies which are now under consideration to be put into effect during the next fiscal years will result in manpower economies necessary to remove the apparent deficits for fiscal 1956 and fiscal 1957.

We are working hard and we are confident these savings will be made so that we will man the 127 wings by the end of fiscal 1956 with 975,000 personnel and 137 wings by the end of fiscal 1957 with 975,000 personnel. I call your attention to these facts so that this committee will know that additional economies have to be made in man power requirements in order that the Air Force be able to attain its goal of manning the full force of 137 wings with 975,000 military personnel by the end of fiscal 1957. I also want to assure you that there is no question but that it will be done.

It should appear self-evident that many actions have occurred in the Air Force this year to economize on manpower when you compare the requirements as they now exist to what they were in the past. Some of the actions that have been taken are as follows:

1. The total number of bands originally programmed for fiscal 1954 was 110, to be manned by 4,063 personnel. Under the present program we will have 74 bands with 2,406 officers and airmen.

2. Manning standards for support functions were reduced in such areas as air police (20% reduction), motor vehicles (9,000 spaces), food service (by 8,000), and major headquarters.

3. Missions and work loads of major sub-commands were analyzed, with resultant savings.

4. At the time the 1954 budget was presented to Congress, the program showed a pilot training rate of 7,200 and funds and spaces were requested for this rate. Plans implemented during the year now provide for increasing the input into pilot training before the end of fiscal 1954 in order that the former rate may be increased to 7,800 and this will be done within the structure of the budget.

5. An early release policy was established to remove from the Air Force those persons, surplus to the needs of the Air Force, who were engaged in non-technical skills. Concurrently, the traning program was geared to replace these people with persons capable of being trained in the technical skills where shortages existed. Under this program airmen were to be released during fiscal 1954 in three categories, as follows:

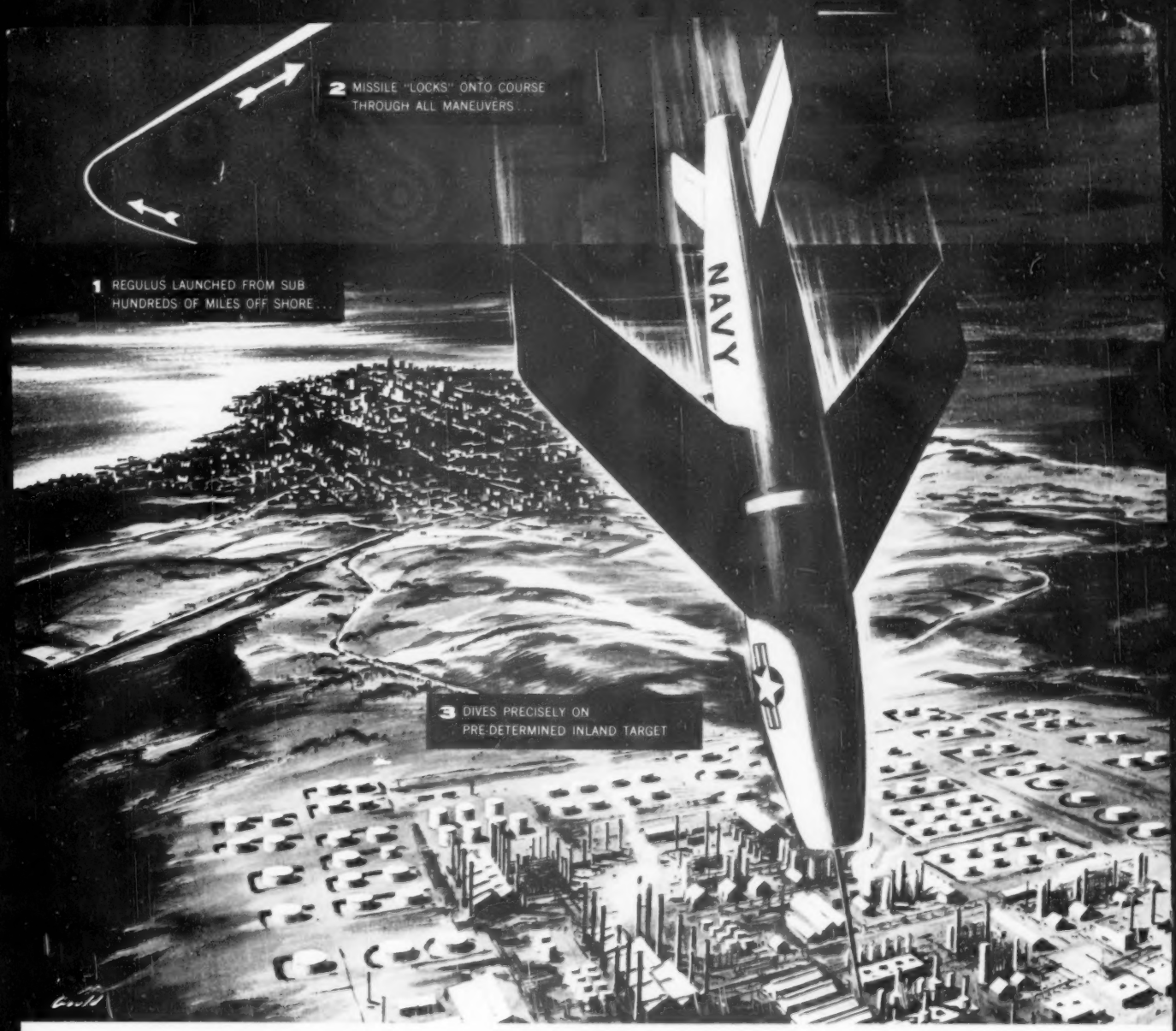
(A) All airmen returning from overseas who had but six months remaining on their enlistments and who did not desire to reenlist were released. This was done because it was felt that the absorbing of these men by a Zone of Interior duty station would take most of the six months remaining, leaving little benefit to be secured from them. Additionally, reassigning them would involve two travel moves: one to a new duty station and then home a short time later. It is better to replace them immediately with men who would serve in the Air Force for four years.

(B) All persons surplus in non-technical skills who showed conclusively they did not have the capability to be cross-trained in a technical area where shortages existed were released after two years' service. These persons are prevented from reenlisting.

(C) All persons who had served three years of their four-year enlistment and who were engaged in a surplus non-technical area, and who did not desire to reenlist, were separated from the service. This was done because it was recognized that there was no point in holding for a year a person who was surplus and who would only cease to become surplus after the date that his enlistment expired.

Under the above program, approximately 15,400 airmen due for release in fiscal 1954 have already been released in fiscal 1954 but at a date much earlier than originally due for release. Approximately 42,000 airmen have already been released in fiscal 1954 who were not due for release until fiscal 1955, and 9,600 airmen have already been released in fiscal 1954 who were not due for release until fiscal 1956 or thereafter. We are also considering releasing an additional group of airmen in fiscal 1954 who were not due for release until fiscal 1955. It can, therefore, be seen from the summary of this program that we have already pre-released approximately 67,000 military personnel and our pre-release program may result in the release of an additional group of airmen.

(*To be continued next week*)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